

PyCAMA report generated by tropl2-proc

tropl2-proc

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1 Short Introduction

1.1 The list of parameters

You may want to keep the list given in table 1 at hand when viewing the results.

2 Definitions

The averages shown here are *unweighed* averages:

$$\bar{x} = \frac{1}{N} \sum_{i=1}^N x_i \quad (1)$$

with N the number of observations in the dataset.

The spread of the measurements is indicated with the variance $V(x)$, or rather the standard deviation $\sigma(x) = \sqrt{V(x)}$.

$$V(x) = \frac{1}{N-1} \sum_{i=1}^N (x_i - \bar{x})^2 \quad (2)$$

We also report the more robust statistics median, minimum, maximum, various percentiles and inter quartile range.

The median m is the value of parameter x for which half of the observations of x is smaller than m :

$$P(x \leq m) = P(x \geq m) = \int_{-\infty}^m f(x) dx = \frac{1}{2} \quad (3)$$

with $f(x)$ the probability density function.

The median is a special case of a percentile. Instead of 1/2 in equation 3, other threshold values can be used. We report results for 1 %, 5 %, 10 %, 15.9 %, 25 %, 75 %, 84.1 %, 90 %, 95 % and 99 %. The inter quartile range is the difference between the 75 % and 25 % percentiles. Similarly the minimum and maximum values correspond to the 0 % and 100 % percentiles respectively.

For normally distributed parameters the mean and median are the same, while the $\mu \pm \sigma$ values and the 15.9 % and 84.1 % percentiles coincide.

To get a measure for the relation of one variable $x_{(k)}$ with another $x_{(l)}$, we calculate the covariance matrix C_{kl} .

$$C_{kl} = C(x_{(k)}, x_{(l)}) = \frac{1}{N-1} \sum_{i=1}^N (x_{(k),i} - \bar{x}_{(k)})(x_{(l),i} - \bar{x}_{(l)}) \quad (4)$$

Rather than a dimensionally dependent covariance, it is often easier to interpret a correlation matrix R_{kl} , a matrix of Pearson's r coefficients:

$$R_{kl} = R(x_{(k)}, x_{(l)}) = \frac{C_{kl}}{\sqrt{C_{kk}C_{ll}}} = \frac{C_{kl}}{\sqrt{V(x_k)V(x_l)}} \quad (5)$$

The diagonal elements of the covariance matrix are the variances of the elements, $V(x_{(k)}) = C_{kk}$ and obviously $R_{kk} = 1$.

Table 1: Parameterlist and basic statistics for the analysis

Variable	mean $\pm \sigma$	Count	Mode	IQR	Median	Minimum	Maximum
qa value [1]	0.682 ± 0.402	15884117	0.995	0.750	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.505 \pm 101.995) \times 10^{-2}$	15884117	0.278	0.486	1.169×10^{-2}	-81.5	862
sulfurdioxide total vertical column precision [DU]	0.547 ± 0.717	15884117	0.222	0.382	0.348	3.346×10^{-2}	665
sulfurdioxide slant column density corrected [DU]	$(2.114 \pm 42.477) \times 10^{-2}$	15884117	0.267	0.378	9.892×10^{-3}	-12.7	500
sulfurdioxide slant column density cobra [DU]	$(2.095 \pm 38.395) \times 10^{-2}$	15884117	0.267	0.378	9.892×10^{-3}	-12.7	96.3
sulfurdioxide slant column density cobra precision [DU]	0.308 ± 0.145	15884117	0.213	0.156	0.264	7.969×10^{-2}	52.4
sulfurdioxide slant column density window1 [DU]	0.203 ± 0.721	15884117	0.225	0.764	0.215	-130	206
sulfurdioxide slant column density window1 precision [DU]	0.308 ± 0.145	15884117	0.213	0.156	0.264	7.969×10^{-2}	52.4
sulfurdioxide slant column density corrected win1 [DU]	$(6.306 \pm 71.449) \times 10^{-2}$	15884117	2.500×10^{-2}	0.753	4.231×10^{-2}	-130	205
background so2 slant column offset window1 [DU]	-0.140 ± 0.159	15884117	-0.180	0.156	-0.171	-1.43	2.17
sulfurdioxide slant column density window2 [DU]	3.22 ± 9.43	15884117	2.25	11.9	2.96	-2.518×10^3	1.504×10^3
sulfurdioxide slant column density window2 precision [DU]	8.43 ± 2.33	15884117	7.43	2.72	8.09	2.33	764
sulfurdioxide slant column density corrected win2 [DU]	-0.490 ± 9.149	15884117	-0.250	11.5	-0.492	-2.521×10^3	1.498×10^3
background so2 slant column offset window2 [DU]	-3.71 ± 2.52	15884117	-1.75	3.83	-2.98	-17.5	3.07
sulfurdioxide slant column density window3 [DU]	-12.8 ± 25.0	15884117	-12.9	31.4	-12.6	-447	499
sulfurdioxide slant column density window3 precision [DU]	29.1 ± 13.3	15884117	23.7	10.0	25.7	9.32	267
sulfurdioxide slant column density corrected win3 [DU]	5.04 ± 24.37	15884117	3.92	30.7	5.13	-437	515
background so2 slant column offset window3 [DU]	17.9 ± 6.2	15884117	12.9	10.2	17.2	-5.18	40.8
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	15884117	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.173 \pm 6.525) \times 10^{-2}$	15884117	1.217×10^{-2}	2.280×10^{-2}	1.383×10^{-2}	2.562×10^{-4}	2.58
fitted radiance shift [nm]	$(-4.783 \pm 26.305) \times 10^{-4}$	15884117	-5.000×10^{-4}	1.886×10^{-3}	-4.671×10^{-4}	-5.412×10^{-2}	7.199×10^{-2}
fitted radiance squeeze [1]	$(-2.280 \pm 19.806) \times 10^{-5}$	15884117	-1.000×10^{-5}	2.134×10^{-4}	-1.042×10^{-5}	-2.444×10^{-2}	1.426×10^{-2}
fitted root mean square [1]	$(1.347 \pm 0.592) \times 10^{-3}$	15884117	9.750×10^{-4}	6.057×10^{-4}	1.175×10^{-3}	3.197×10^{-4}	0.113
sulfurdioxide total air mass factor polluted [1]	0.835 ± 0.410	15884117	0.740	0.519	0.775	5.000×10^{-2}	2.94
sulfurdioxide total air mass factor polluted precision [1]	$(9.964 \pm 9.451) \times 10^{-2}$	15884117	3.500×10^{-2}	9.885×10^{-2}	6.655×10^{-2}	3.340×10^{-3}	1.78
sulfurdioxide clear air mass factor polluted [1]	0.714 ± 0.272	15884117	0.700	0.340	0.697	8.377×10^{-2}	2.96
number of spectral points in retrieval [1]	73.4 ± 0.5	15884117	73.0	1.000	73.0	53.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	6.000×10^{-2}	0.130	0.250	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.36	-0.938	-0.575	-0.386	-0.227	0.259	0.433	0.645	1.06	2.76
sulfurdioxide total vertical column precision [DU]	0.102	0.142	0.170	0.196	0.233	0.615	0.804	1.03	1.49	3.41
sulfurdioxide slant column density corrected [DU]	-0.912	-0.520	-0.373	-0.277	-0.177	0.201	0.307	0.413	0.584	1.12
sulfurdioxide slant column density cobra [DU]	-0.912	-0.520	-0.373	-0.277	-0.177	0.201	0.307	0.413	0.584	1.12
sulfurdioxide slant column density cobra precision [DU]	0.140	0.168	0.183	0.195	0.211	0.367	0.426	0.482	0.577	0.830
sulfurdioxide slant column density window1 [DU]	-1.80	-0.915	-0.590	-0.383	-0.172	0.593	0.792	0.984	1.28	2.08
sulfurdioxide slant column density window1 precision [DU]	0.140	0.168	0.183	0.195	0.211	0.367	0.426	0.482	0.577	0.830
sulfurdioxide slant column density corrected win1 [DU]	-1.74	-0.984	-0.705	-0.521	-0.328	0.425	0.636	0.846	1.18	2.12
background so2 slant column offset window1 [DU]	-0.388	-0.314	-0.290	-0.266	-0.238	-8.256×10^{-2}	-1.782×10^{-2}	5.241×10^{-2}	0.153	0.372
sulfurdioxide slant column density window2 [DU]	-18.4	-11.6	-8.21	-5.70	-2.86	9.03	12.1	15.0	18.9	27.1
sulfurdioxide slant column density window2 precision [DU]	4.42	5.37	5.93	6.37	6.90	9.61	10.5	11.4	12.6	15.1
sulfurdioxide slant column density corrected win2 [DU]	-22.5	-15.2	-11.7	-9.15	-6.26	5.28	8.16	10.7	14.3	21.6
background so2 slant column offset window2 [DU]	-10.1	-8.51	-7.54	-6.66	-5.50	-1.66	-1.36	-1.15	-0.864	5.408×10^{-2}
sulfurdioxide slant column density window3 [DU]	-75.8	-54.1	-43.9	-36.4	-28.4	3.04	11.0	18.1	27.7	46.8
sulfurdioxide slant column density window3 precision [DU]	14.0	16.7	18.6	20.1	21.8	31.8	36.3	42.0	53.7	85.6
sulfurdioxide slant column density corrected win3 [DU]	-56.0	-35.1	-25.2	-18.0	-10.2	20.5	28.3	35.3	44.7	63.8
background so2 slant column offset window3 [DU]	6.06	9.56	10.7	11.6	12.7	22.9	24.7	26.2	28.0	30.9
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	1.214×10^{-3}	2.613×10^{-3}	3.716×10^{-3}	4.885×10^{-3}	6.907×10^{-3}	2.970×10^{-2}	4.572×10^{-2}	6.850×10^{-2}	0.116	0.313
fitted radiance shift [nm]	-8.203×10^{-3}	-4.376×10^{-3}	-3.028×10^{-3}	-2.213×10^{-3}	-1.466×10^{-3}	4.203×10^{-4}	1.133×10^{-3}	2.029×10^{-3}	3.559×10^{-3}	7.748×10^{-3}
fitted radiance squeeze [1]	-6.440×10^{-4}	-3.477×10^{-4}	-2.449×10^{-4}	-1.821×10^{-4}	-1.203×10^{-4}	9.310×10^{-5}	1.456×10^{-4}	1.939×10^{-4}	2.623×10^{-4}	4.198×10^{-4}
fitted root mean square [1]	6.000×10^{-4}	7.458×10^{-4}	8.250×10^{-4}	8.859×10^{-4}	9.619×10^{-4}	1.568×10^{-3}	1.834×10^{-3}	2.098×10^{-3}	2.496×10^{-3}	3.471×10^{-3}
sulfurdioxide total air mass factor polluted [1]	8.862×10^{-2}	0.248	0.349	0.438	0.548	1.07	1.25	1.41	1.61	1.97
sulfurdioxide total air mass factor polluted precision [1]	1.089×10^{-2}	1.854×10^{-2}	2.452×10^{-2}	2.984×10^{-2}	3.662×10^{-2}	0.135	0.173	0.209	0.268	0.454
sulfurdioxide clear air mass factor polluted [1]	0.223	0.321	0.388	0.449	0.528	0.868	0.959	1.04	1.15	1.52
number of spectral points in retrieval [1]	73.0	73.0	73.0	73.0	73.0	74.0	74.0	74.0	74.0	74.0

Table 3: Parameterlist and basic statistics for the analysis for observations in the northern hemisphere

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.690 $\pm$ 0.408	8377121	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	(3.294 $\pm$ 112.219) $\times 10^{-2}$	8377121	0.505	1.129 $\times 10^{-2}$	-81.5	292	-0.237	0.268
sulfurdioxide total vertical column precision [DU]	0.605 $\pm$ 0.817	8377121	0.441	0.363	4.731 $\times 10^{-2}$	159	0.233	0.674
sulfurdioxide slant column density corrected [DU]	(1.701 $\pm$ 34.960) $\times 10^{-2}$	8377121	0.362	8.932 $\times 10^{-3}$	-5.66	96.3	-0.170	0.192
sulfurdioxide slant column density cobra [DU]	(1.697 $\pm$ 34.745) $\times 10^{-2}$	8377121	0.362	8.932 $\times 10^{-3}$	-5.66	96.3	-0.170	0.192
sulfurdioxide slant column density cobra precision [DU]	0.289 $\pm$ 0.123	8377121	0.134	0.254	8.731 $\times 10^{-2}$	52.4	0.207	0.341
sulfurdioxide slant column density window1 [DU]	0.224 $\pm$ 0.656	8377121	0.733	0.230	-18.3	206	-0.139	0.594
sulfurdioxide slant column density window1 precision [DU]	0.289 $\pm$ 0.123	8377121	0.134	0.254	8.731 $\times 10^{-2}$	52.4	0.207	0.341
sulfurdioxide slant column density corrected win1 [DU]	(5.834 $\pm$ 64.978) $\times 10^{-2}$	8377121	0.722	4.240 $\times 10^{-2}$	-18.3	205	-0.313	0.409
background so2 slant column offset window1 [DU]	-0.165 $\pm$ 0.126	8377121	0.138	-0.184	-1.43	1.45	-0.247	-0.109
sulfurdioxide slant column density window2 [DU]	2.78 $\pm$ 9.21	8377121	11.7	2.56	-182	228	-3.19	8.51
sulfurdioxide slant column density window2 precision [DU]	8.42 $\pm$ 2.31	8377121	2.81	8.10	2.33	239	6.85	9.66
sulfurdioxide slant column density corrected win2 [DU]	-0.389 $\pm$ 9.006	8377121	11.4	-0.383	-188	222	-6.11	5.33
background so2 slant column offset window2 [DU]	-3.17 $\pm$ 2.04	8377121	2.77	-2.59	-14.4	2.18	-4.39	-1.61
sulfurdioxide slant column density window3 [DU]	-12.7 $\pm$ 25.7	8377121	32.1	-12.4	-218	183	-28.5	3.58
sulfurdioxide slant column density window3 precision [DU]	29.8 $\pm$ 14.3	8377121	11.0	26.2	9.32	267	21.9	32.8
sulfurdioxide slant column density corrected win3 [DU]	4.65 $\pm$ 24.94	8377121	31.3	4.79	-201	199	-10.8	20.5
background so2 slant column offset window3 [DU]	17.4 $\pm$ 6.5	8377121	10.9	16.2	-5.18	39.7	11.9	22.8
sulfurdioxide slant column cobra flag [1]	1.97 $\pm$ 0.23	8377121	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	(4.542 $\pm$ 0.039) $\times 10^{-2}$	8377121	3.546 $\times 10^{-2}$	2.247 $\times 10^{-2}$	2.562 $\times 10^{-4}$	2.58	1.096 $\times 10^{-2}$	4.643 $\times 10^{-2}$
fitted radiance shift [nm]	(-1.647 $\pm$ 27.947) $\times 10^{-4}$	8377121	1.794 $\times 10^{-3}$	-2.248 $\times 10^{-4}$	-4.690 $\times 10^{-2}$	5.480 $\times 10^{-2}$	-1.087 $\times 10^{-3}$	7.070 $\times 10^{-4}$
fitted radiance squeeze [1]	(-1.537 $\pm$ 17.048) $\times 10^{-5}$	8377121	2.010 $\times 10^{-4}$	-1.074 $\times 10^{-5}$	-1.854 $\times 10^{-2}$	4.089 $\times 10^{-3}$	-1.132 $\times 10^{-4}$	8.784 $\times 10^{-5}$
fitted root mean square [1]	(1.276 $\pm$ 0.500) $\times 10^{-3}$	8377121	5.515 $\times 10^{-4}$	1.146 $\times 10^{-3}$	3.487 $\times 10^{-4}$	0.113	9.404 $\times 10^{-4}$	1.492 $\times 10^{-3}$
sulfurdioxide total air mass factor polluted [1]	0.771 $\pm$ 0.406	8377121	0.533	0.727	5.000 $\times 10^{-2}$	2.94	0.469	1.00
sulfurdioxide total air mass factor polluted precision [1]	(9.957 $\pm$ 10.786) $\times 10^{-2}$	8377121	9.774 $\times 10^{-2}$	5.879 $\times 10^{-2}$	3.826 $\times 10^{-3}$	1.78	3.295 $\times 10^{-2}$	0.131
sulfurdioxide clear air mass factor polluted [1]	0.696 $\pm$ 0.281	8377121	0.415	0.677	8.377 $\times 10^{-2}$	2.96	0.474	0.889
number of spectral points in retrieval [1]	73.5 $\pm$ 0.5	8377121	1.000	73.0	53.0	74.0	73.0	74.0

Table 4: Parameterlist and basic statistics for the analysis for observations in the southern hemisphere

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.675 ± 0.396	7506996	0.740	1.000	0.0	1.000	0.260	1.000
sulfurdioxide total vertical column [DU]	$(3.742 \pm 89.213) \times 10^{-2}$	7506996	0.466	1.209×10^{-2}	-61.8	862	-0.217	0.250
sulfurdioxide total vertical column precision [DU]	0.483 ± 0.579	7506996	0.324	0.336	3.346×10^{-2}	665	0.233	0.557
sulfurdioxide slant column density corrected [DU]	$(2.576 \pm 49.533) \times 10^{-2}$	7506996	0.399	1.108×10^{-2}	-12.7	500	-0.186	0.213
sulfurdioxide slant column density cobra [DU]	$(2.538 \pm 42.092) \times 10^{-2}$	7506996	0.399	1.108×10^{-2}	-12.7	36.0	-0.186	0.213
sulfurdioxide slant column density cobra precision [DU]	0.329 ± 0.163	7506996	0.185	0.276	7.969×10^{-2}	33.4	0.216	0.401
sulfurdioxide slant column density window1 [DU]	0.180 ± 0.787	7506996	0.802	0.197	-130	70.1	-0.210	0.591
sulfurdioxide slant column density window1 precision [DU]	0.329 ± 0.163	7506996	0.185	0.276	7.969×10^{-2}	33.4	0.216	0.401
sulfurdioxide slant column density corrected win1 [DU]	$(6.833 \pm 78.036) \times 10^{-2}$	7506996	0.789	4.220×10^{-2}	-130	69.9	-0.345	0.444
background so2 slant column offset window1 [DU]	-0.112 ± 0.185	7506996	0.181	-0.152	-0.782	2.17	-0.227	-4.560×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.72 ± 9.65	7506996	12.1	3.42	-2.518×10^3	1.504×10^3	-2.48	9.59
sulfurdioxide slant column density window2 precision [DU]	8.43 ± 2.36	7506996	2.62	8.09	2.42	764	6.94	9.56
sulfurdioxide slant column density corrected win2 [DU]	-0.603 ± 9.303	7506996	11.6	-0.616	-2.521×10^3	1.498×10^3	-6.43	5.21
background so2 slant column offset window2 [DU]	-4.32 ± 2.84	7506996	4.93	-3.76	-17.5	3.07	-6.68	-1.75
sulfurdioxide slant column density window3 [DU]	-13.0 ± 24.1	7506996	30.7	-12.9	-447	499	-28.2	2.46
sulfurdioxide slant column density window3 precision [DU]	28.3 ± 12.0	7506996	8.97	25.3	9.88	242	21.7	30.7
sulfurdioxide slant column density corrected win3 [DU]	5.48 ± 23.71	7506996	30.0	5.50	-437	515	-9.47	20.6
background so2 slant column offset window3 [DU]	18.4 ± 5.8	7506996	9.25	17.9	-3.31	40.8	13.7	23.0
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	7506996	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.646 \pm 3.682) \times 10^{-2}$	7506996	1.040×10^{-2}	9.228×10^{-3}	3.581×10^{-4}	1.44	4.949×10^{-3}	1.535×10^{-2}
fitted radiance shift [nm]	$(-8.283 \pm 23.861) \times 10^{-4}$	7506996	1.892×10^{-3}	-7.569×10^{-4}	-5.412×10^{-2}	7.199×10^{-2}	-1.817×10^{-3}	7.530×10^{-5}
fitted radiance squeeze [1]	$(-3.109 \pm 22.459) \times 10^{-5}$	7506996	2.290×10^{-4}	-1.002×10^{-5}	-2.444×10^{-2}	1.426×10^{-2}	-1.296×10^{-4}	9.934×10^{-5}
fitted root mean square [1]	$(1.427 \pm 0.671) \times 10^{-3}$	7506996	6.904×10^{-4}	1.209×10^{-3}	3.197×10^{-4}	8.331×10^{-2}	9.868×10^{-4}	1.677×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.906 ± 0.403	7506996	0.518	0.824	5.000×10^{-2}	2.76	0.629	1.15
sulfurdioxide total air mass factor polluted precision [1]	$(9.972 \pm 7.692) \times 10^{-2}$	7506996	9.953×10^{-2}	7.754×10^{-2}	3.340×10^{-3}	1.58	3.964×10^{-2}	0.139
sulfurdioxide clear air mass factor polluted [1]	0.734 ± 0.260	7506996	0.263	0.708	8.491×10^{-2}	2.79	0.581	0.844
number of spectral points in retrieval [1]	73.4 ± 0.5	7506996	1.000	73.0	53.0	74.0	73.0	74.0

Table 5: Parameterlist and basic statistics for the analysis for observations over water

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.691 ± 0.394	10914308	0.720	1.000	0.0	1.000	0.280	1.000
sulfurdioxide total vertical column [DU]	$(3.217 \pm 84.597) \times 10^{-2}$	10914308	0.451	1.104×10^{-2}	-61.8	300	-0.211	0.240
sulfurdioxide total vertical column precision [DU]	0.484 ± 0.602	10914308	0.322	0.319	3.346×10^{-2}	665	0.222	0.544
sulfurdioxide slant column density corrected [DU]	$(2.123 \pm 40.883) \times 10^{-2}$	10914308	0.372	9.738×10^{-3}	-8.65	311	-0.174	0.198
sulfurdioxide slant column density cobra [DU]	$(2.105 \pm 38.000) \times 10^{-2}$	10914308	0.372	9.738×10^{-3}	-8.65	29.3	-0.174	0.198
sulfurdioxide slant column density cobra precision [DU]	0.305 ± 0.149	10914308	0.162	0.254	7.969×10^{-2}	33.4	0.207	0.369
sulfurdioxide slant column density window1 [DU]	0.200 ± 0.722	10914308	0.753	0.215	-102	70.1	-0.167	0.586
sulfurdioxide slant column density window1 precision [DU]	0.305 ± 0.149	10914308	0.162	0.254	7.969×10^{-2}	33.4	0.207	0.369
sulfurdioxide slant column density corrected win1 [DU]	$(6.408 \pm 71.516) \times 10^{-2}$	10914308	0.741	4.278×10^{-2}	-102	69.9	-0.322	0.419
background so2 slant column offset window1 [DU]	-0.135 ± 0.169	10914308	0.160	-0.171	-0.782	2.17	-0.239	-7.859×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.27 ± 9.22	10914308	11.7	2.98	-1.412×10^3	1.504×10^3	-2.74	8.96
sulfurdioxide slant column density window2 precision [DU]	8.22 ± 2.18	10914308	2.56	7.90	2.33	764	6.78	9.33
sulfurdioxide slant column density corrected win2 [DU]	-0.531 ± 8.904	10914308	11.3	-0.534	-1.421×10^3	1.498×10^3	-6.20	5.13
background so2 slant column offset window2 [DU]	-3.80 ± 2.66	10914308	4.19	-2.94	-17.5	3.07	-5.80	-1.61
sulfurdioxide slant column density window3 [DU]	-10.3 ± 24.2	10914308	30.8	-10.4	-321	148	-25.7	5.16
sulfurdioxide slant column density window3 precision [DU]	27.9 ± 11.9	10914308	9.03	24.9	9.32	267	21.4	30.4
sulfurdioxide slant column density corrected win3 [DU]	7.37 ± 23.40	10914308	29.8	7.14	-304	172	-7.57	22.2
background so2 slant column offset window3 [DU]	17.6 ± 6.1	10914308	10.0	16.8	-5.18	40.8	12.6	22.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	10914308	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.872 \pm 3.810) \times 10^{-2}$	10914308	1.378×10^{-2}	1.147×10^{-2}	4.848×10^{-4}	2.51	6.087×10^{-3}	1.986×10^{-2}
fitted radiance shift [nm]	$(-5.680 \pm 24.289) \times 10^{-4}$	10914308	1.924×10^{-3}	-5.212×10^{-4}	-5.412×10^{-2}	7.199×10^{-2}	-1.577×10^{-3}	3.469×10^{-4}
fitted radiance squeeze [1]	$(-2.339 \pm 20.301) \times 10^{-5}$	10914308	2.115×10^{-4}	-7.505×10^{-6}	-2.444×10^{-2}	1.323×10^{-2}	-1.170×10^{-4}	9.455×10^{-5}
fitted root mean square [1]	$(1.339 \pm 0.618) \times 10^{-3}$	10914308	6.079×10^{-4}	1.139×10^{-3}	3.197×10^{-4}	8.331×10^{-2}	9.453×10^{-4}	1.553×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.873 ± 0.391	10914308	0.489	0.822	5.000×10^{-2}	2.76	0.606	1.10
sulfurdioxide total air mass factor polluted precision [1]	$(9.700 \pm 8.013) \times 10^{-2}$	10914308	9.210×10^{-2}	7.003×10^{-2}	3.340×10^{-3}	1.10	3.997×10^{-2}	0.132
sulfurdioxide clear air mass factor polluted [1]	0.743 ± 0.254	10914308	0.311	0.724	8.491×10^{-2}	2.79	0.576	0.887
number of spectral points in retrieval [1]	73.5 ± 0.5	10914308	1.000	73.0	53.0	74.0	73.0	74.0

Table 6: Parameterlist and basic statistics for the analysis for observations over land

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.698 ± 0.410	3664234	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(3.465 \pm 123.643) \times 10^{-2}$	3664234	0.553	1.196×10^{-2}	-81.5	862	-0.259	0.294
sulfurdioxide total vertical column precision [DU]	0.634 ± 0.811	3664234	0.454	0.409	4.698×10^{-2}	36.3	0.264	0.718
sulfurdioxide slant column density corrected [DU]	$(1.934 \pm 46.494) \times 10^{-2}$	3664234	0.380	9.258×10^{-3}	-12.7	500	-0.179	0.201
sulfurdioxide slant column density cobra [DU]	$(1.906 \pm 37.663) \times 10^{-2}$	3664234	0.380	9.258×10^{-3}	-12.7	36.0	-0.179	0.201
sulfurdioxide slant column density cobra precision [DU]	0.301 ± 0.128	3664234	0.127	0.270	8.845×10^{-2}	18.4	0.219	0.346
sulfurdioxide slant column density window1 [DU]	0.221 ± 0.683	3664234	0.761	0.223	-130	47.2	-0.158	0.604
sulfurdioxide slant column density window1 precision [DU]	0.301 ± 0.128	3664234	0.127	0.270	8.845×10^{-2}	18.4	0.219	0.346
sulfurdioxide slant column density corrected win1 [DU]	$(5.707 \pm 67.573) \times 10^{-2}$	3664234	0.751	3.867×10^{-2}	-130	47.0	-0.330	0.421
background so2 slant column offset window1 [DU]	-0.164 ± 0.129	3664234	0.134	-0.183	-1.43	1.45	-0.246	-0.111
sulfurdioxide slant column density window2 [DU]	2.77 ± 9.77	3664234	12.1	2.61	-2.518×10^3	940	-3.37	8.75
sulfurdioxide slant column density window2 precision [DU]	8.77 ± 2.59	3664234	2.82	8.46	2.39	665	7.17	10.00
sulfurdioxide slant column density corrected win2 [DU]	-0.384 ± 9.585	3664234	11.9	-0.373	-2.521×10^3	939	-6.31	5.56
background so2 slant column offset window2 [DU]	-3.16 ± 1.97	3664234	2.62	-2.65	-13.2	2.38	-4.29	-1.66
sulfurdioxide slant column density window3 [DU]	-18.3 ± 25.4	3664234	31.8	-17.6	-447	499	-33.9	-2.06
sulfurdioxide slant column density window3 precision [DU]	31.6 ± 16.0	3664234	11.1	27.6	9.62	258	23.0	34.1
sulfurdioxide slant column density corrected win3 [DU]	-0.869 ± 25.488	3664234	32.0	-0.411	-437	515	-16.7	15.4
background so2 slant column offset window3 [DU]	17.4 ± 6.1	3664234	9.82	16.4	-5.18	39.7	12.5	22.3
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	3664234	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.228 \pm 9.636) \times 10^{-2}$	3664234	5.885×10^{-2}	3.064×10^{-2}	2.563×10^{-4}	2.52	1.198×10^{-2}	7.083×10^{-2}
fitted radiance shift [nm]	$(-2.911 \pm 30.913) \times 10^{-4}$	3664234	1.720×10^{-3}	-3.752×10^{-4}	-4.179×10^{-2}	3.855×10^{-2}	-1.183×10^{-3}	5.364×10^{-4}
fitted radiance squeeze [1]	$(-2.085 \pm 18.086) \times 10^{-5}$	3664234	2.105×10^{-4}	-1.654×10^{-5}	-1.528×10^{-2}	1.426×10^{-2}	-1.232×10^{-4}	8.725×10^{-5}
fitted root mean square [1]	$(1.313 \pm 0.493) \times 10^{-3}$	3664234	5.116×10^{-4}	1.208×10^{-3}	3.426×10^{-4}	5.086×10^{-2}	9.929×10^{-4}	1.504×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.756 ± 0.426	3664234	0.520	0.677	5.000×10^{-2}	2.94	0.451	0.972
sulfurdioxide total air mass factor polluted precision [1]	0.104 ± 0.120	3664234	0.113	5.228×10^{-2}	3.826×10^{-3}	1.78	2.955×10^{-2}	0.143
sulfurdioxide clear air mass factor polluted [1]	0.656 ± 0.288	3664234	0.375	0.623	8.433×10^{-2}	2.96	0.439	0.814
number of spectral points in retrieval [1]	73.4 ± 0.5	3664234	1.000	73.0	53.0	74.0	73.0	74.0

3 Granule outlines

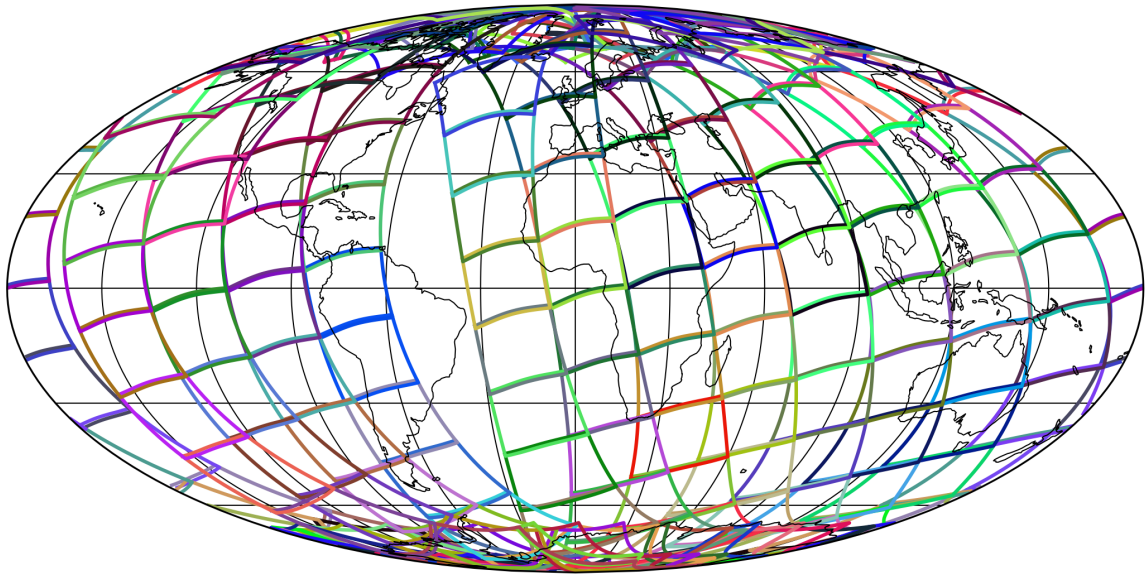


Figure 1: Outline of the granules.

4 Input data monitoring

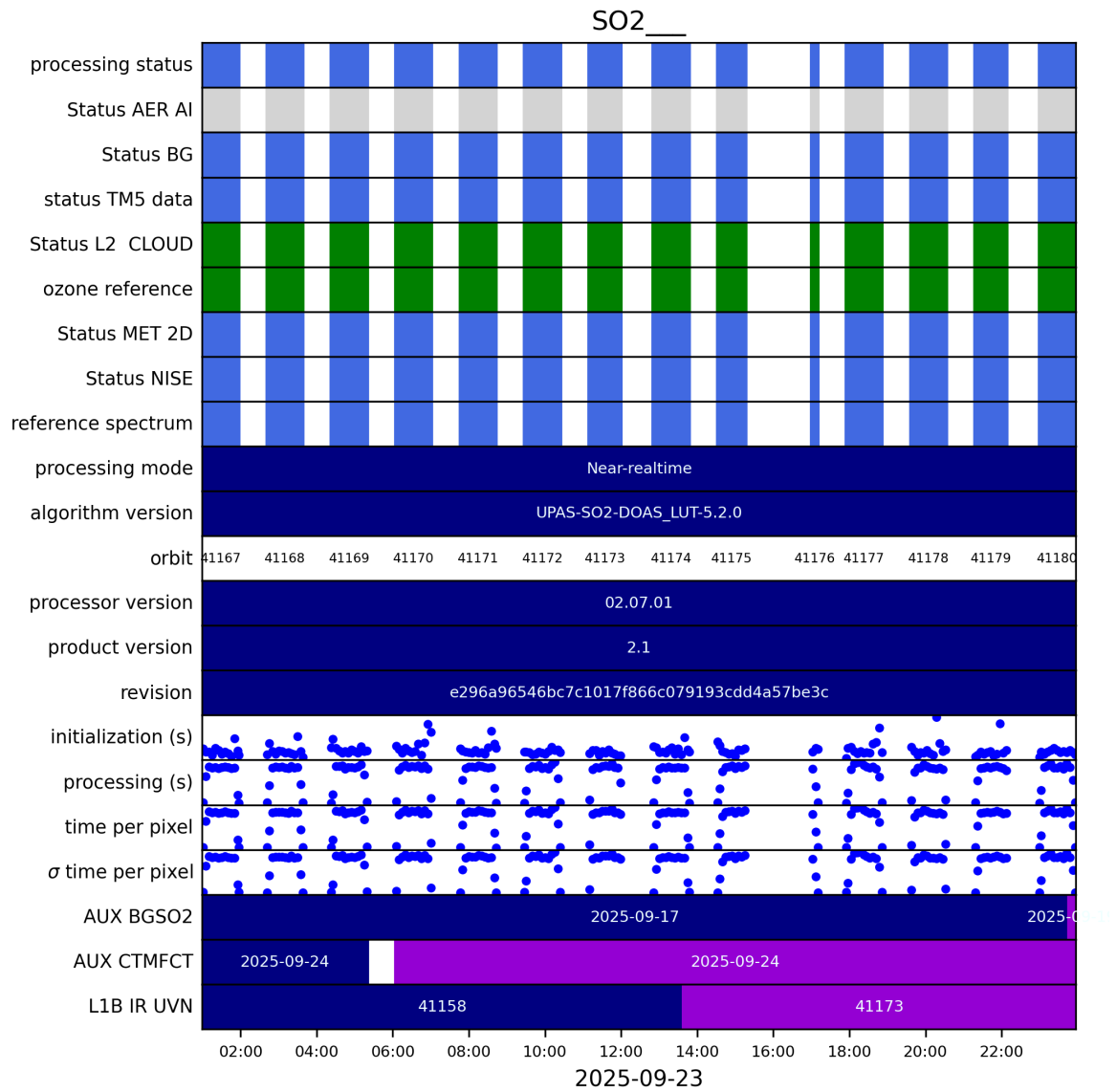


Figure 2: Input data per granule

5 Warnings and errors

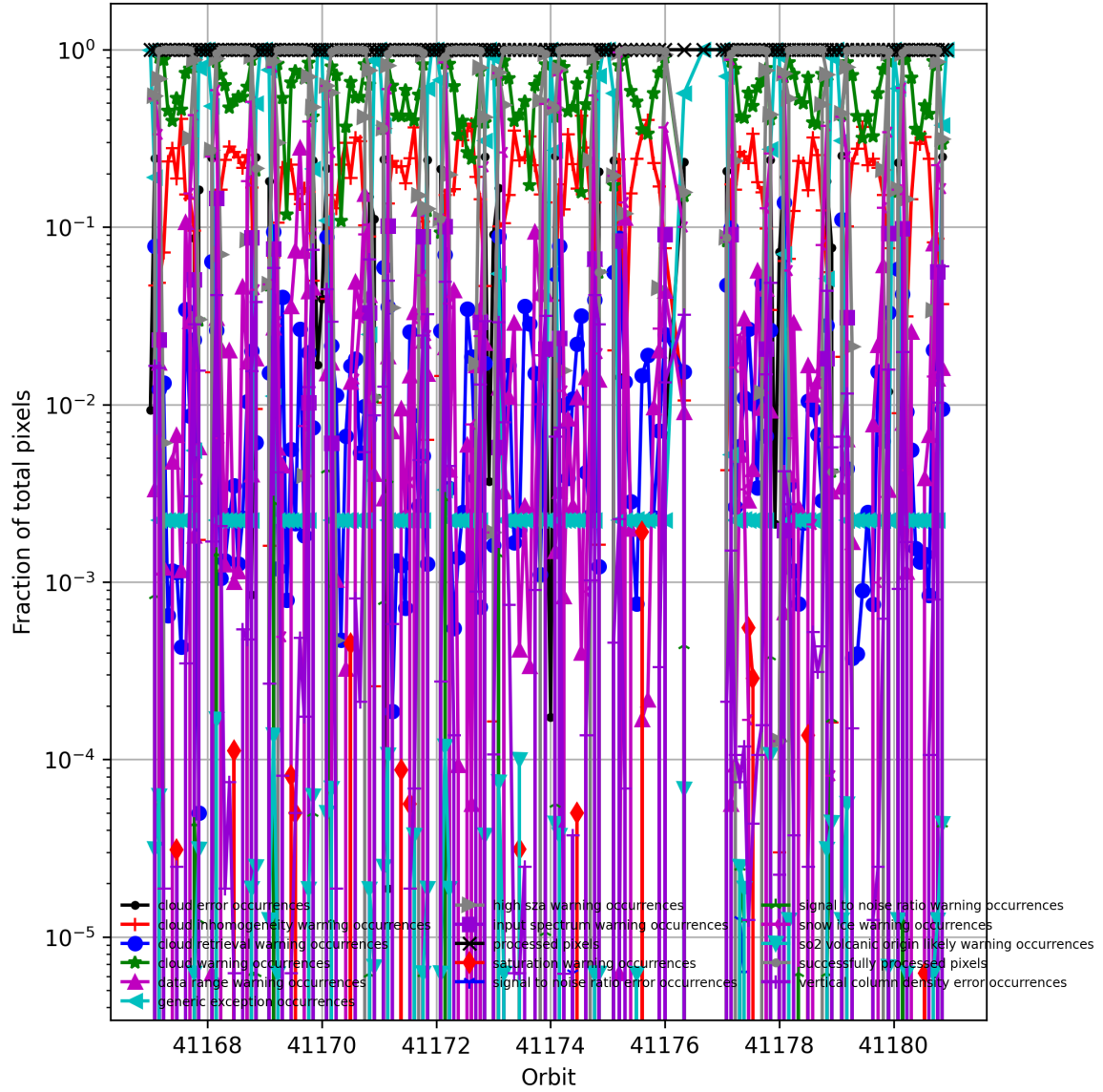


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

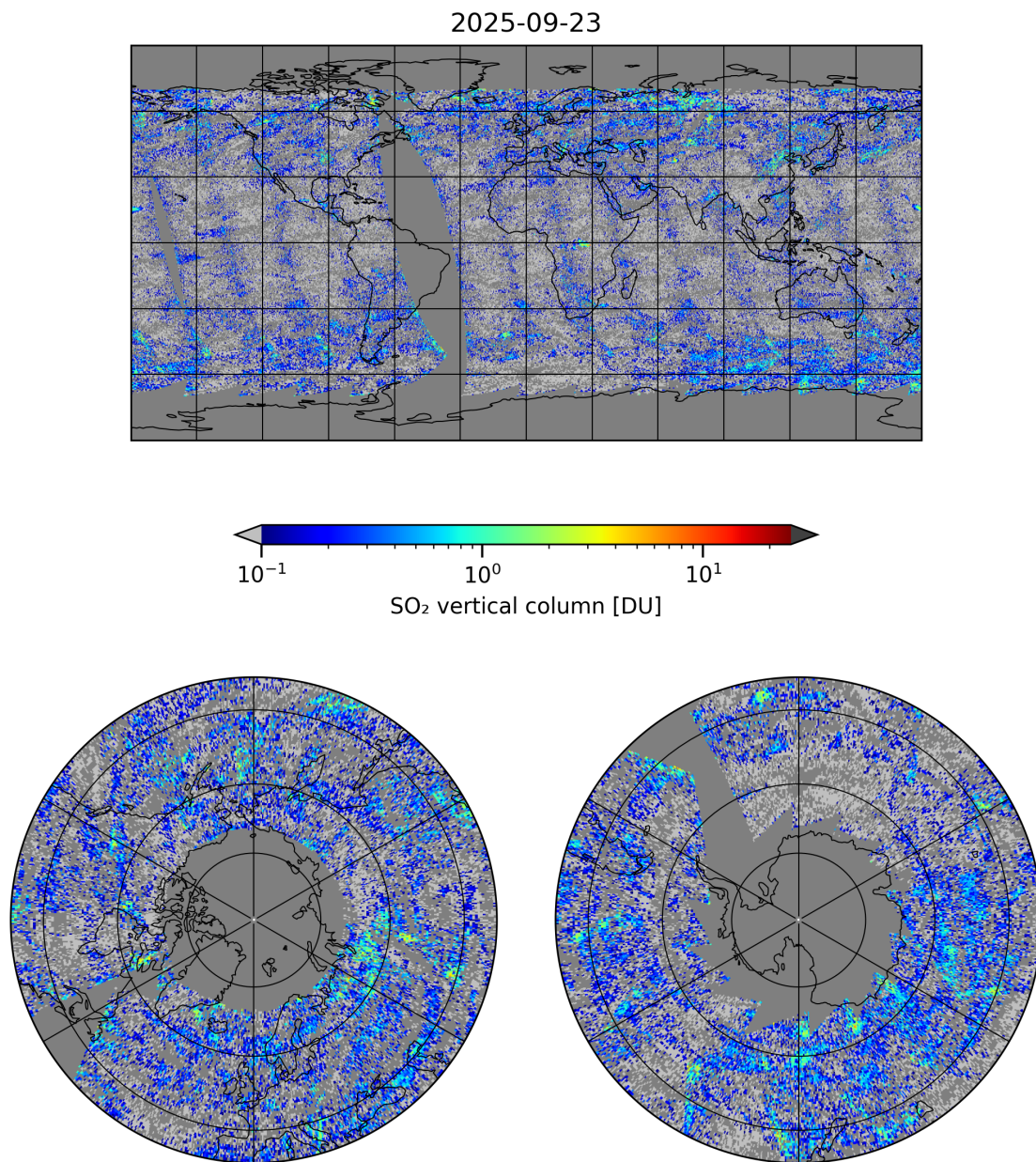


Figure 4: Map of “SO₂ vertical column” for 2025-09-23 to 2025-09-23

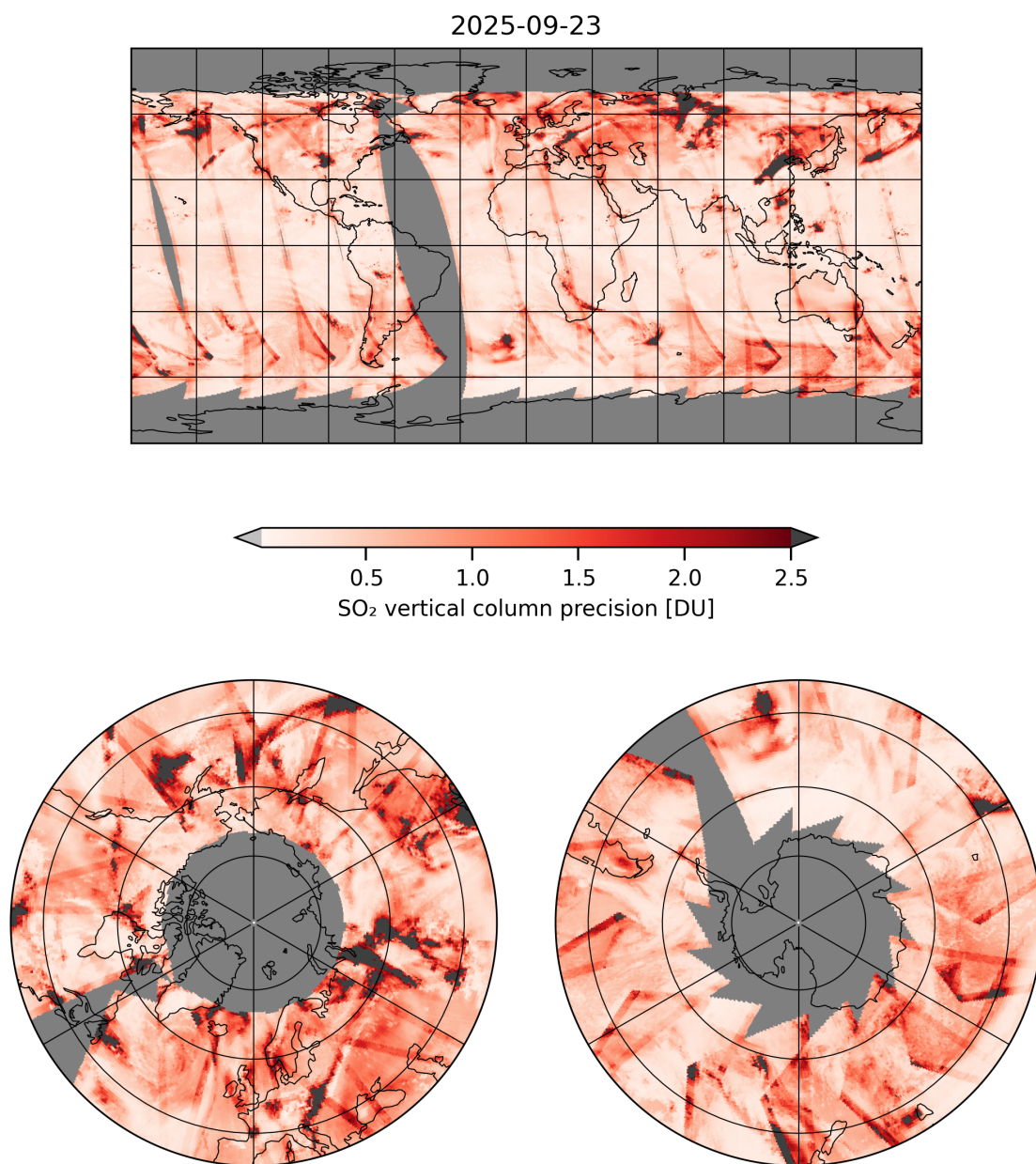


Figure 5: Map of “SO₂ vertical column precision” for 2025-09-23 to 2025-09-23

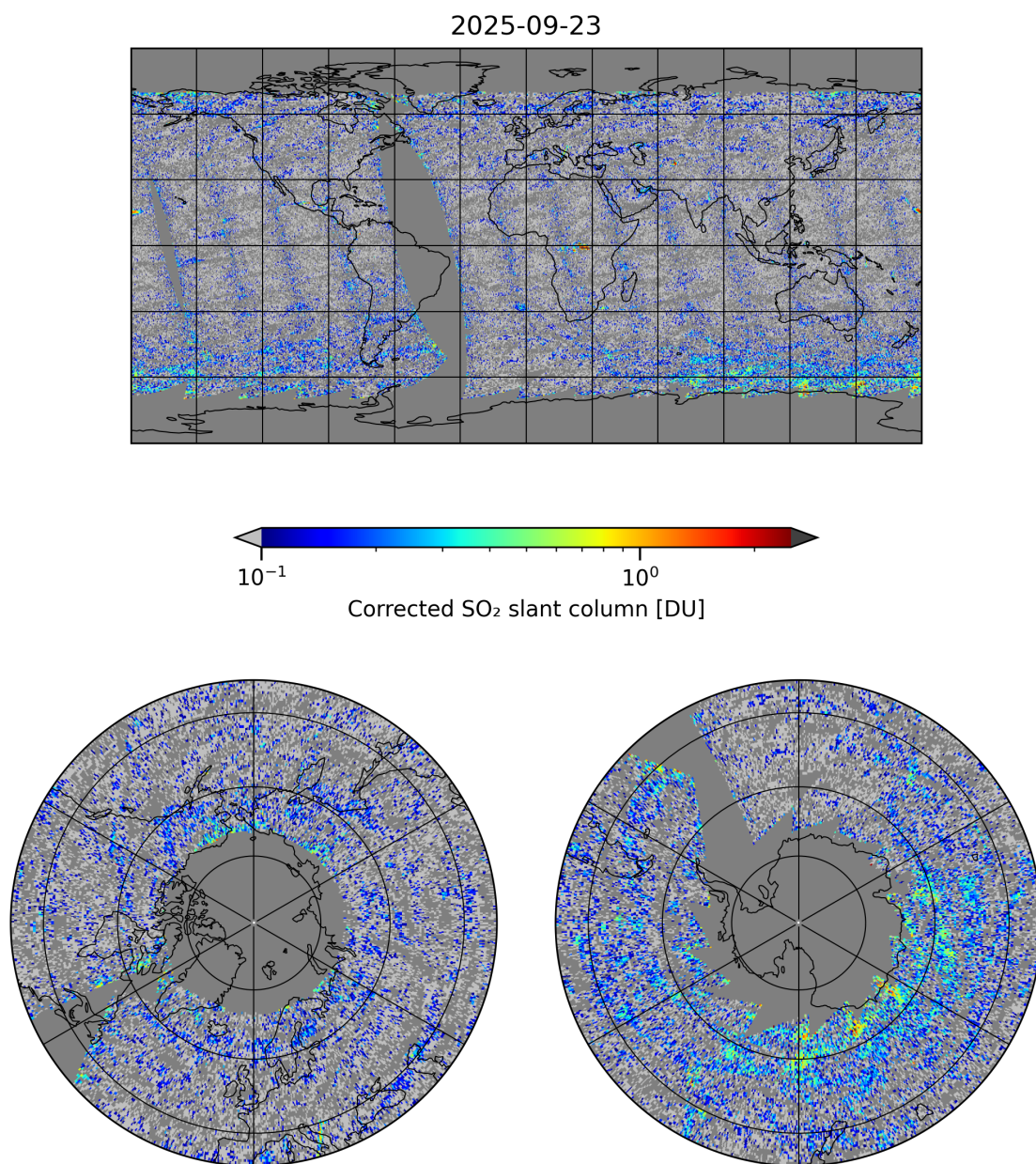


Figure 6: Map of “Corrected SO₂ slant column” for 2025-09-23 to 2025-09-23

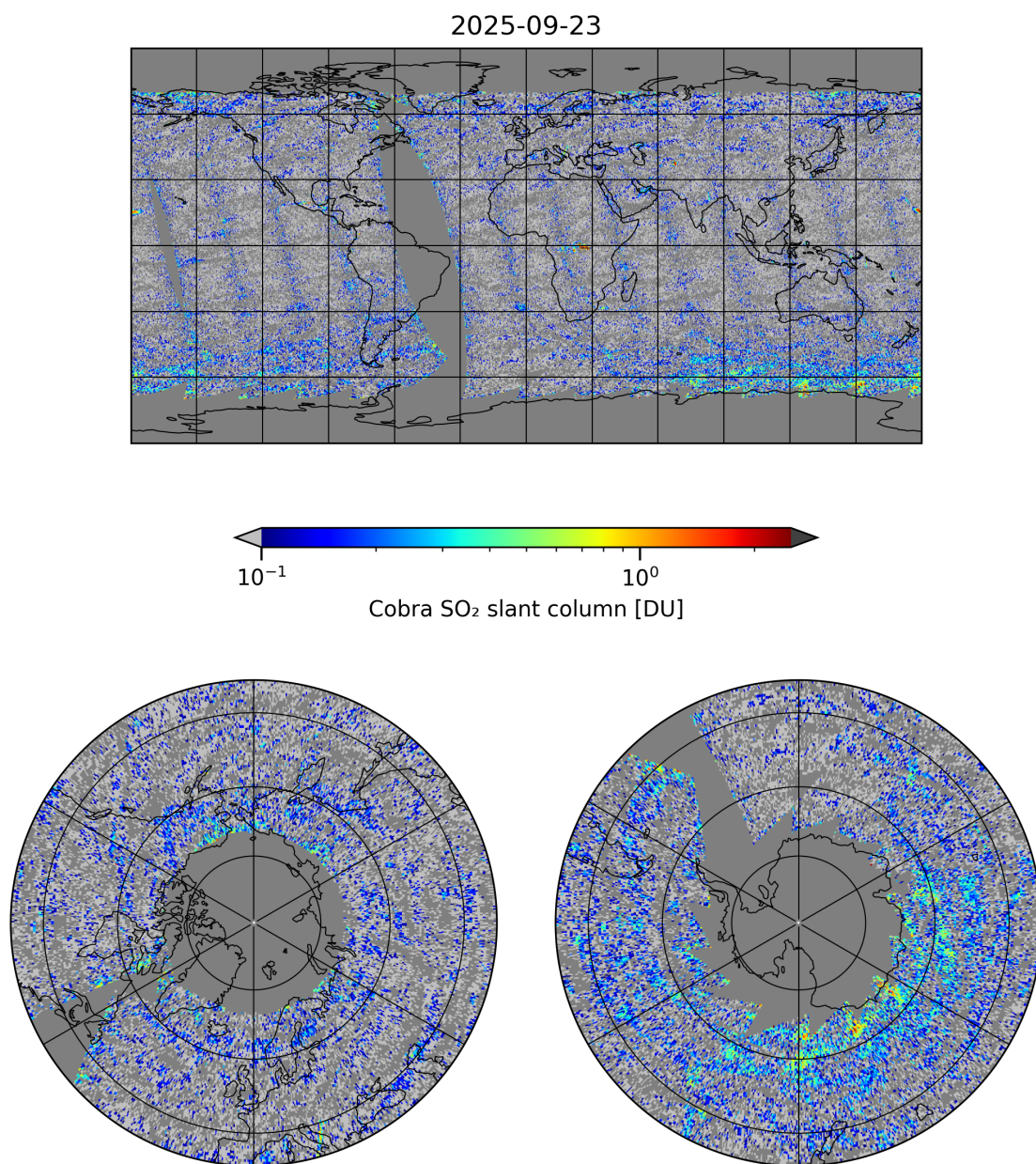


Figure 7: Map of “Cobra SO₂ slant column” for 2025-09-23 to 2025-09-23

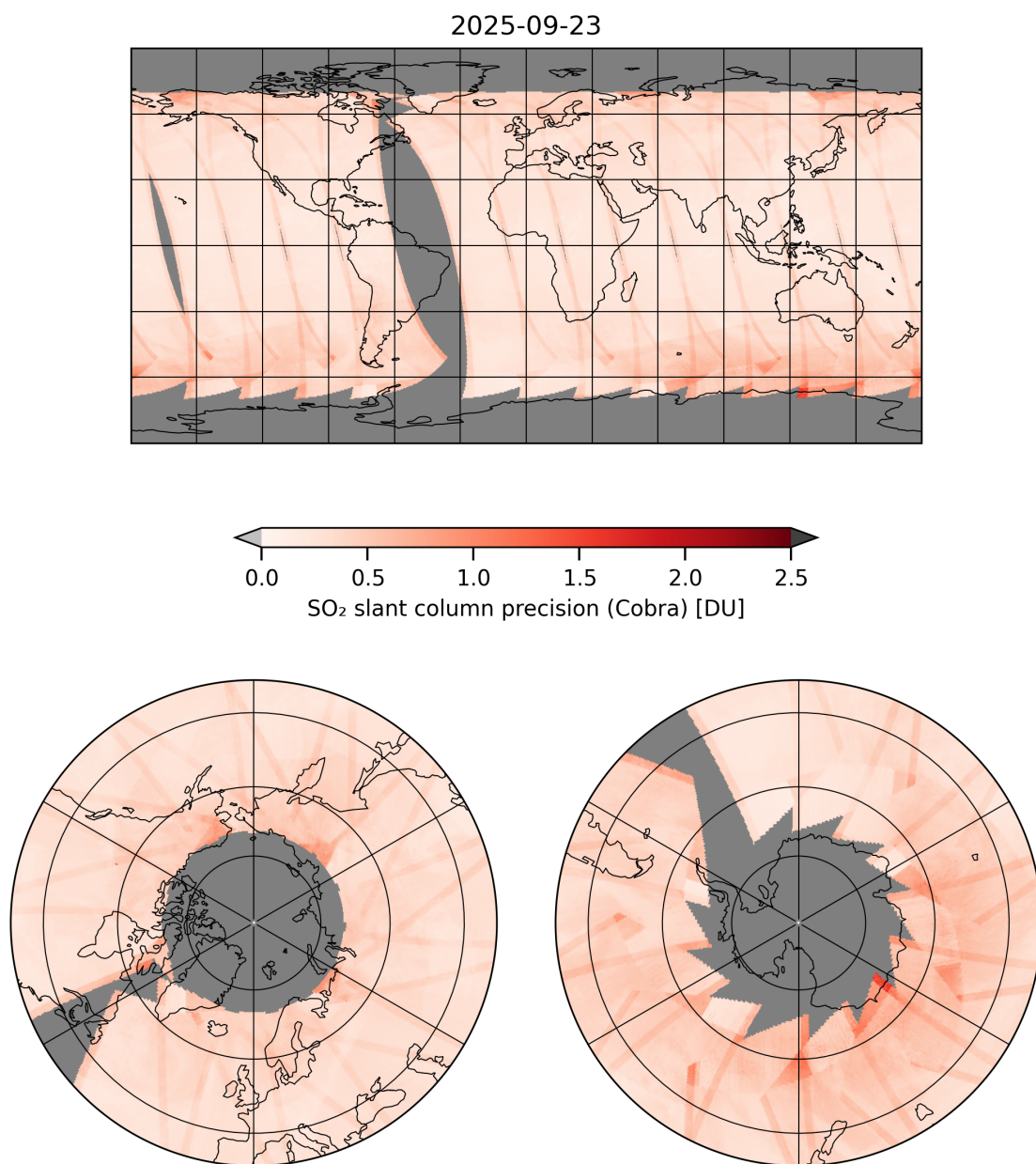


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-09-23 to 2025-09-23

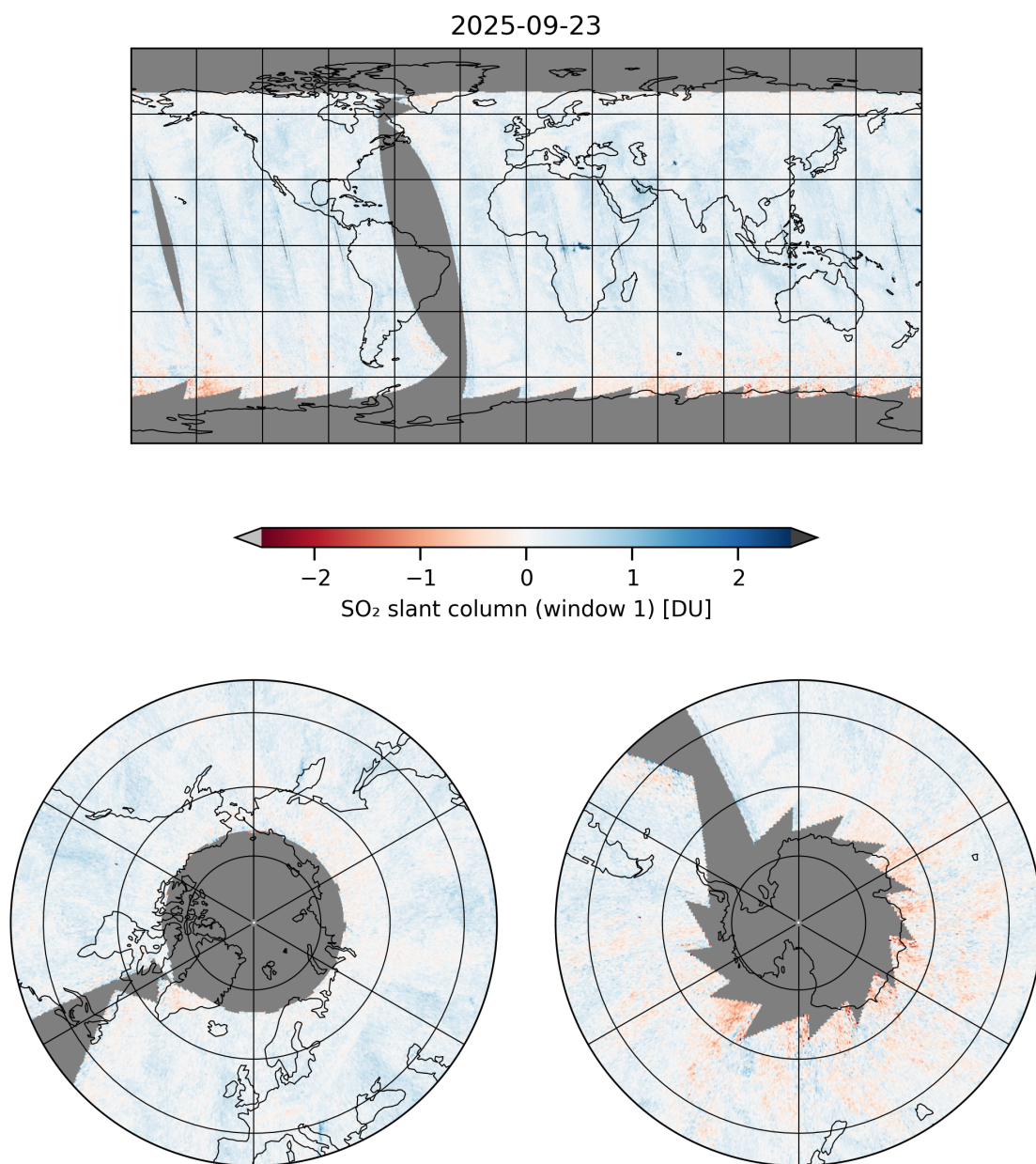


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-09-23 to 2025-09-23

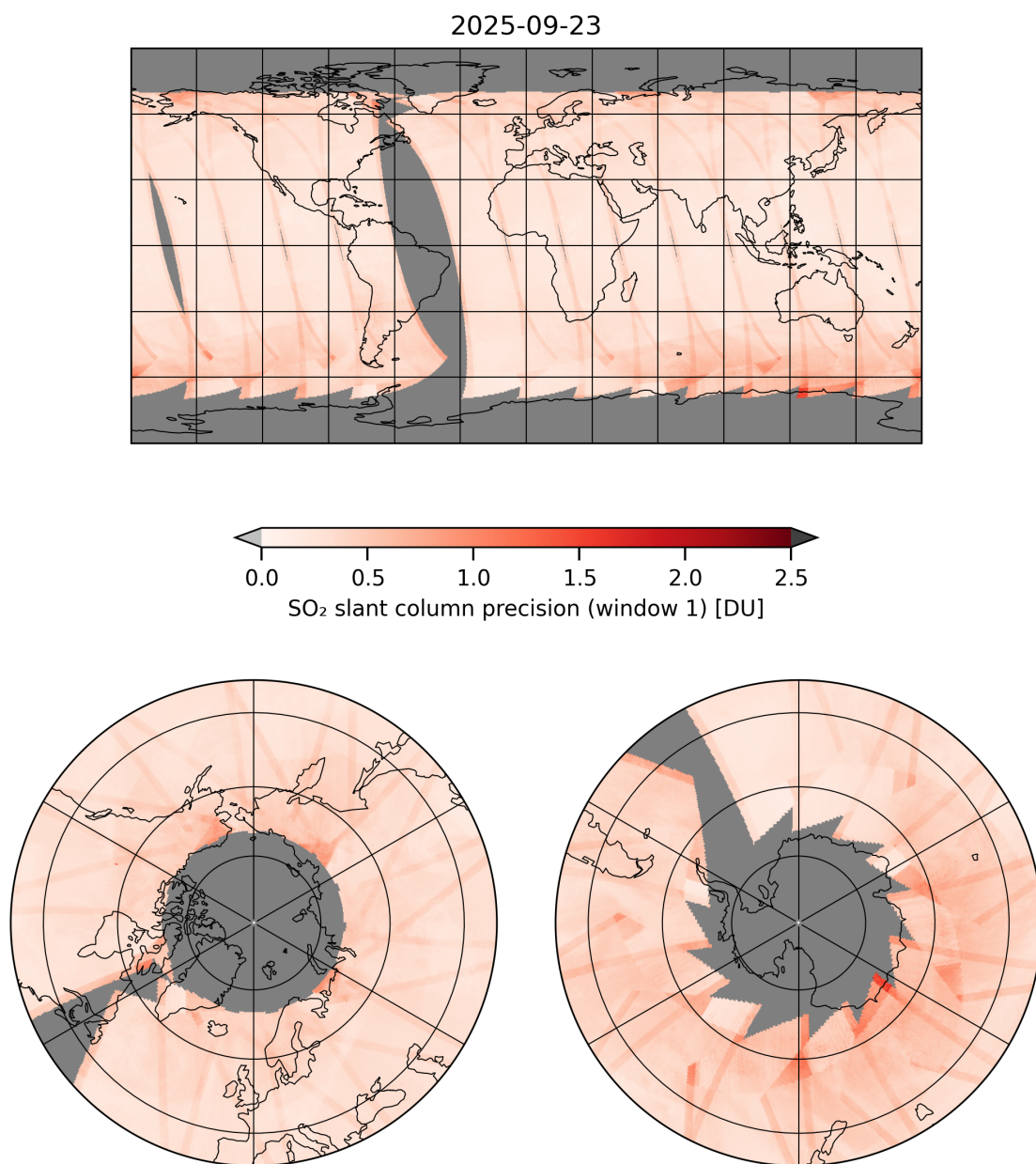


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-09-23 to 2025-09-23

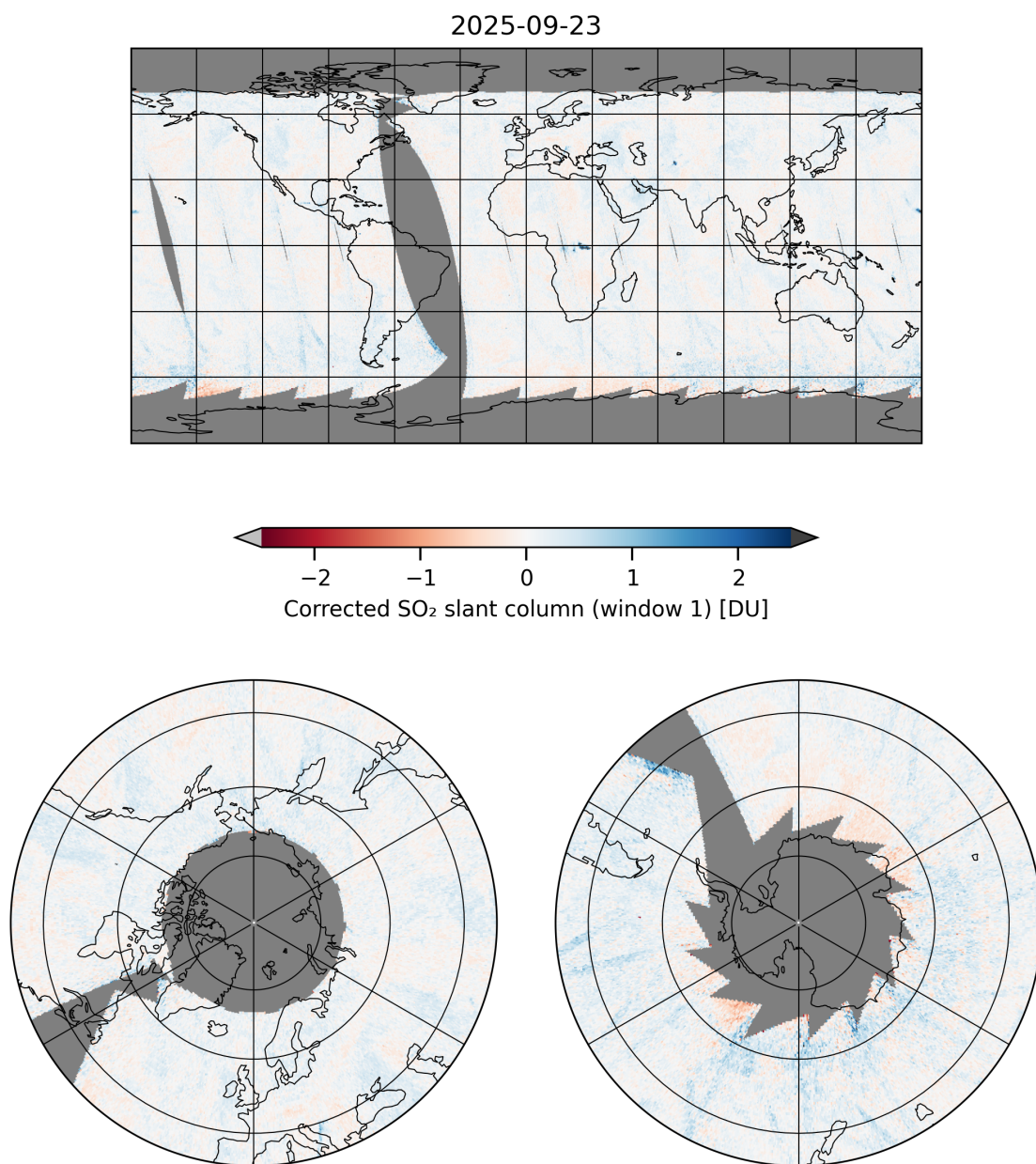


Figure 11: Map of "Corrected SO₂ slant column (window 1)" for 2025-09-23 to 2025-09-23

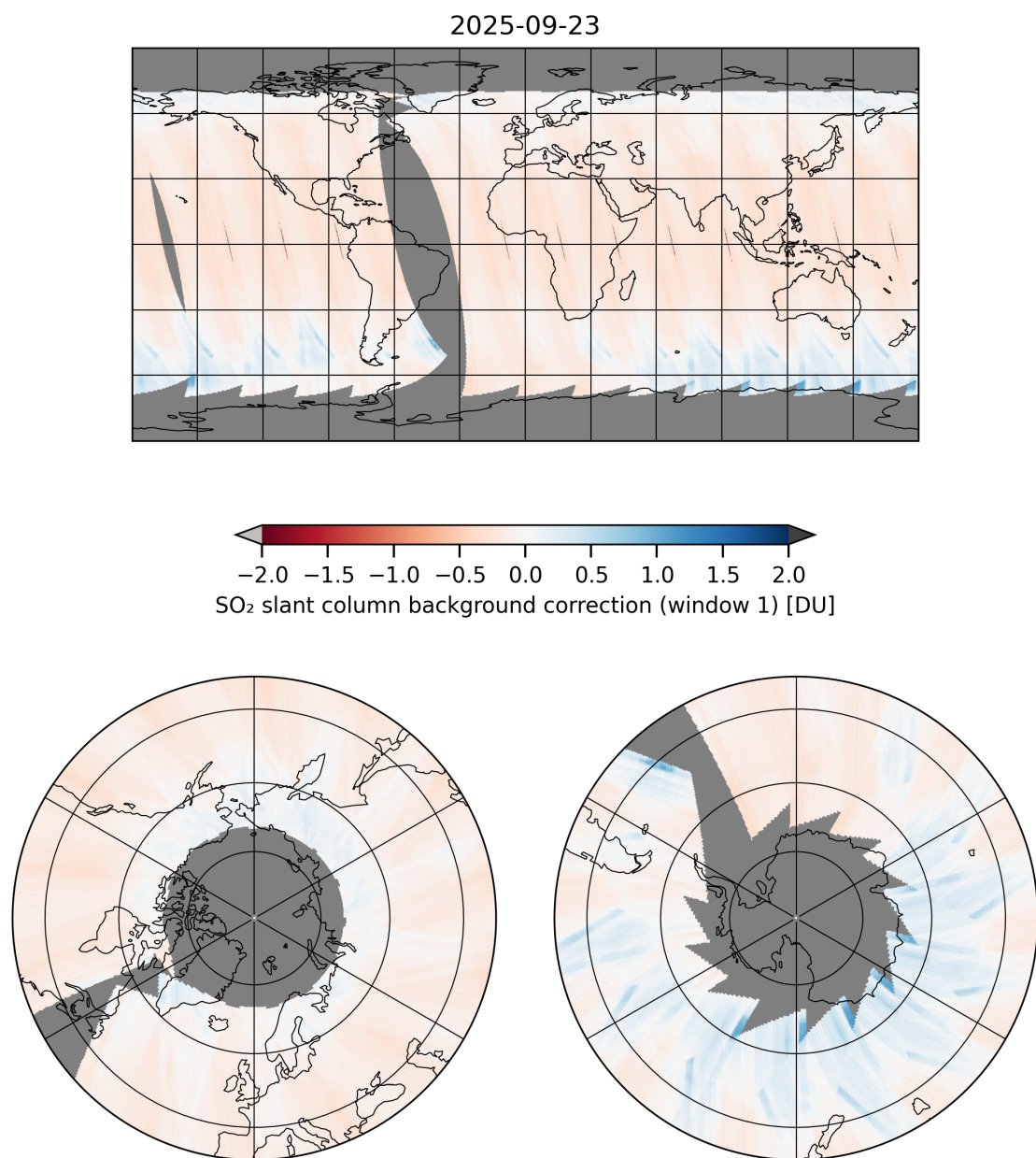


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-09-23 to 2025-09-23

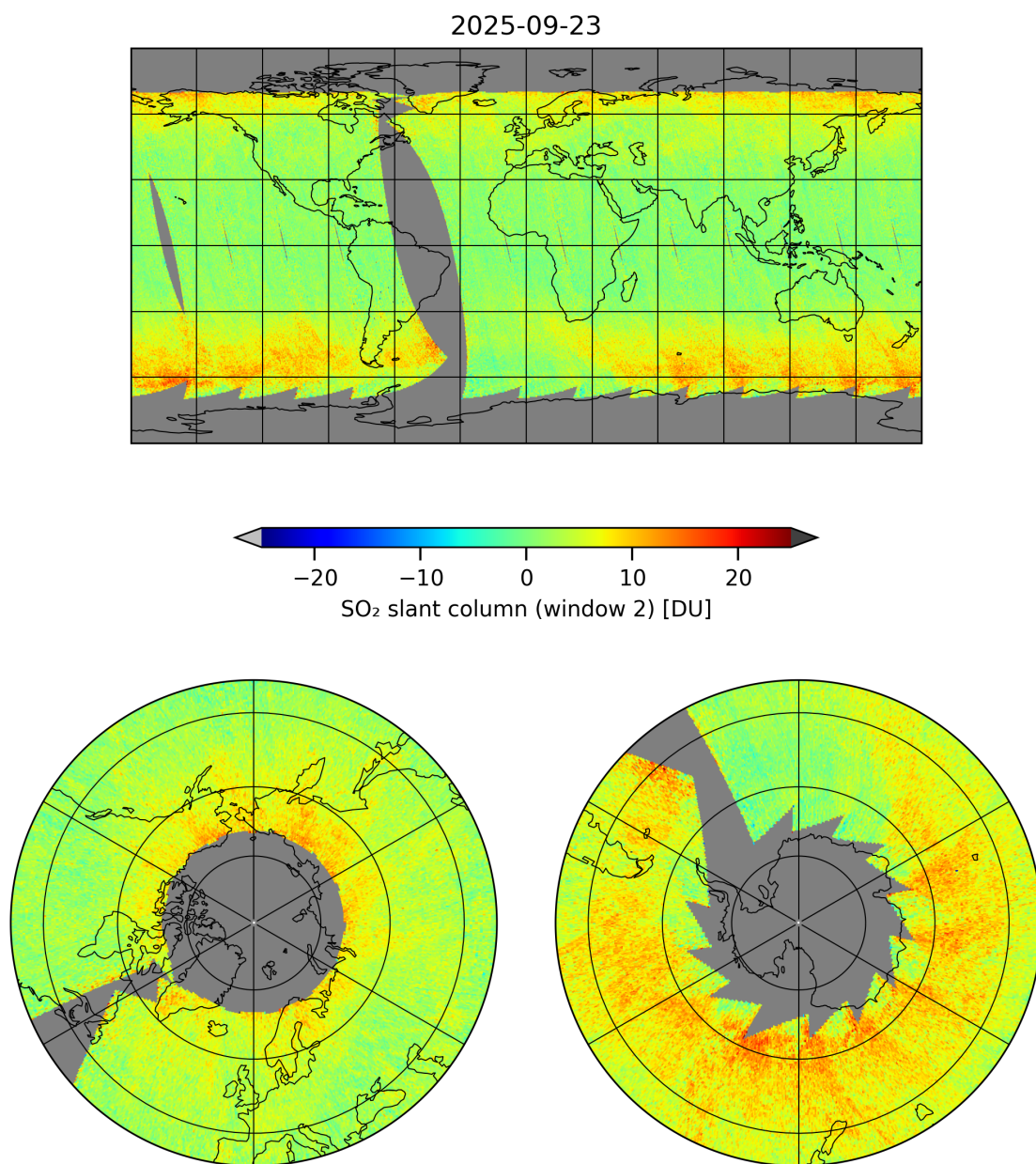


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-09-23 to 2025-09-23

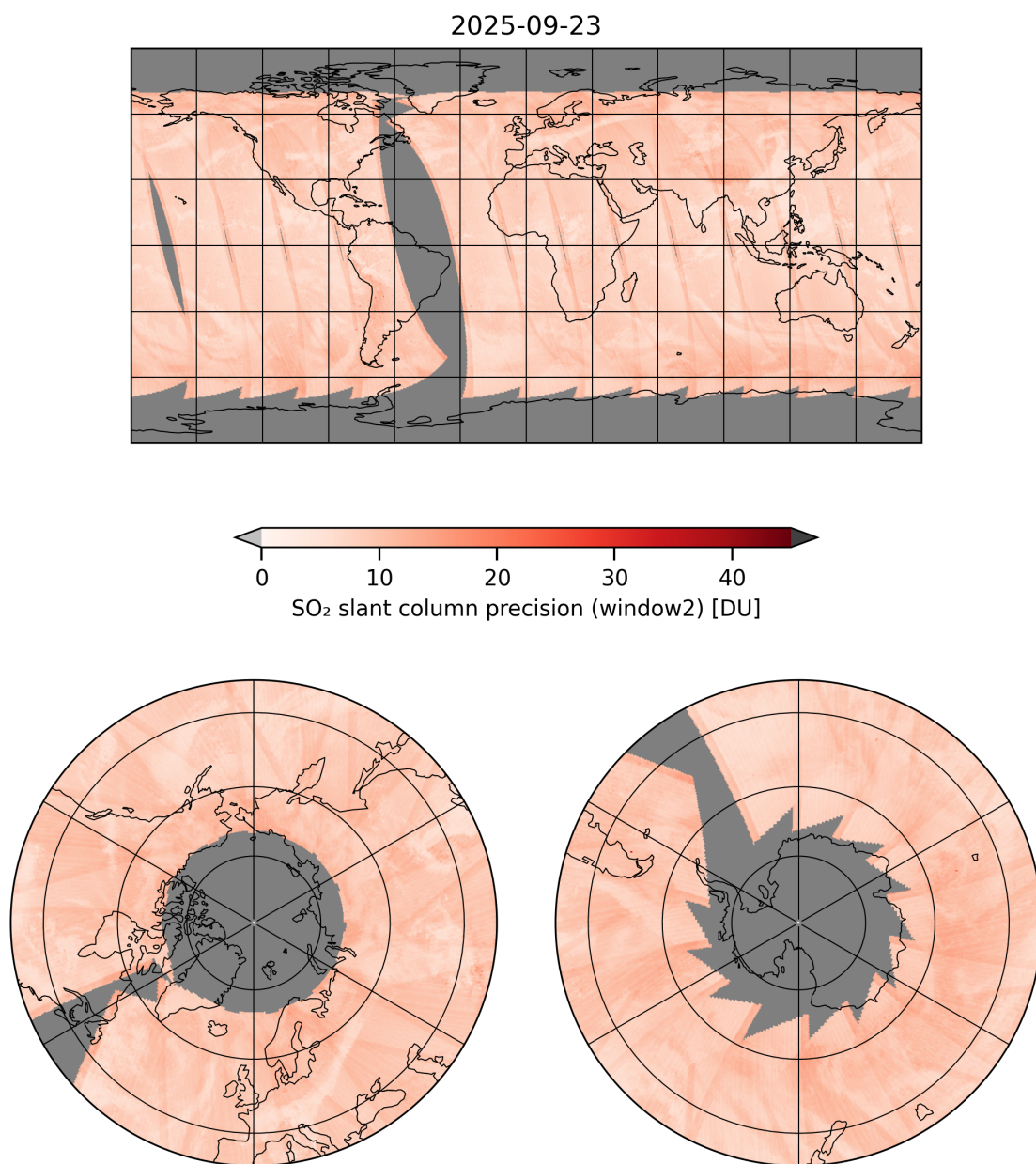


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-09-23 to 2025-09-23

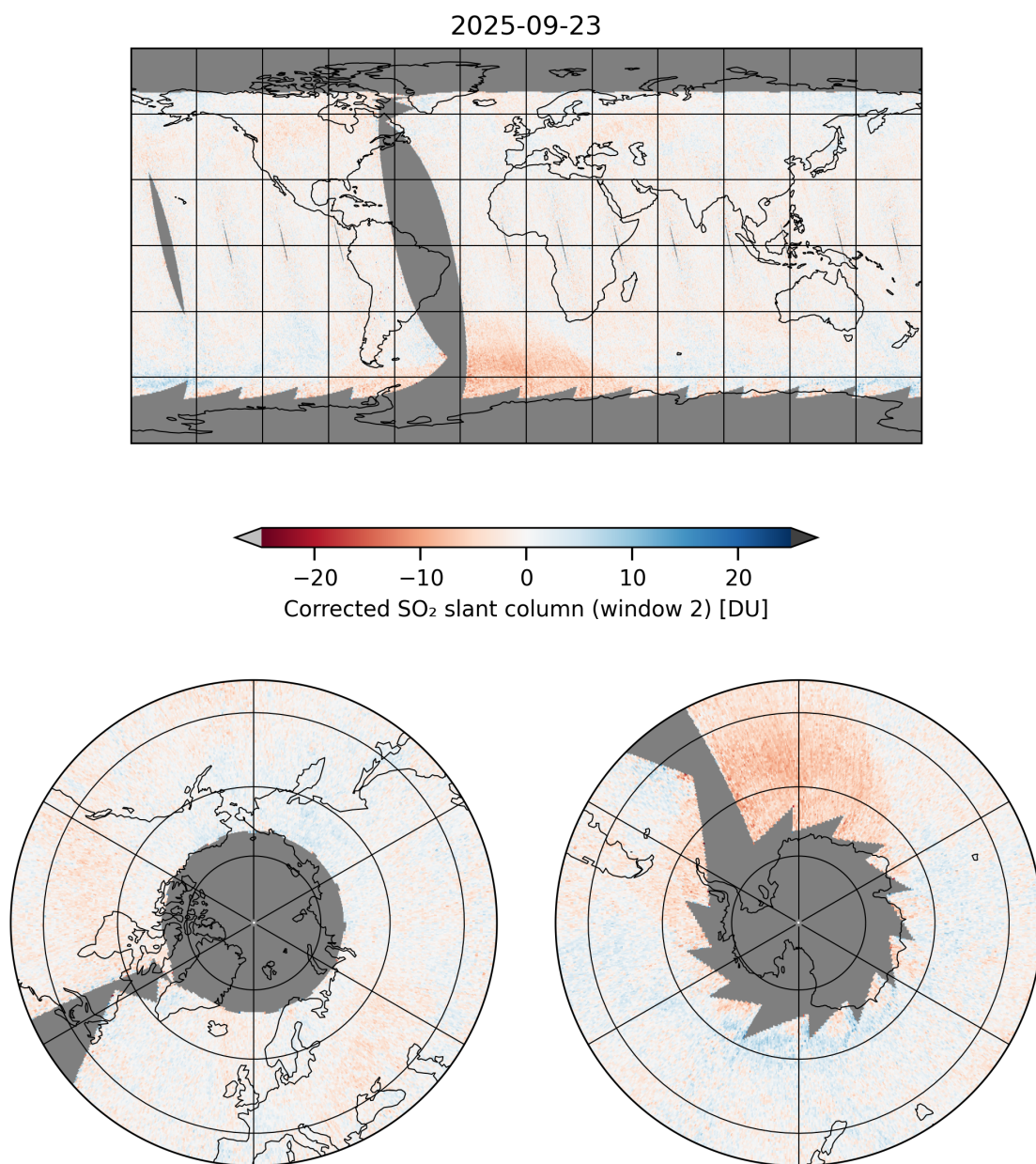


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-09-23 to 2025-09-23

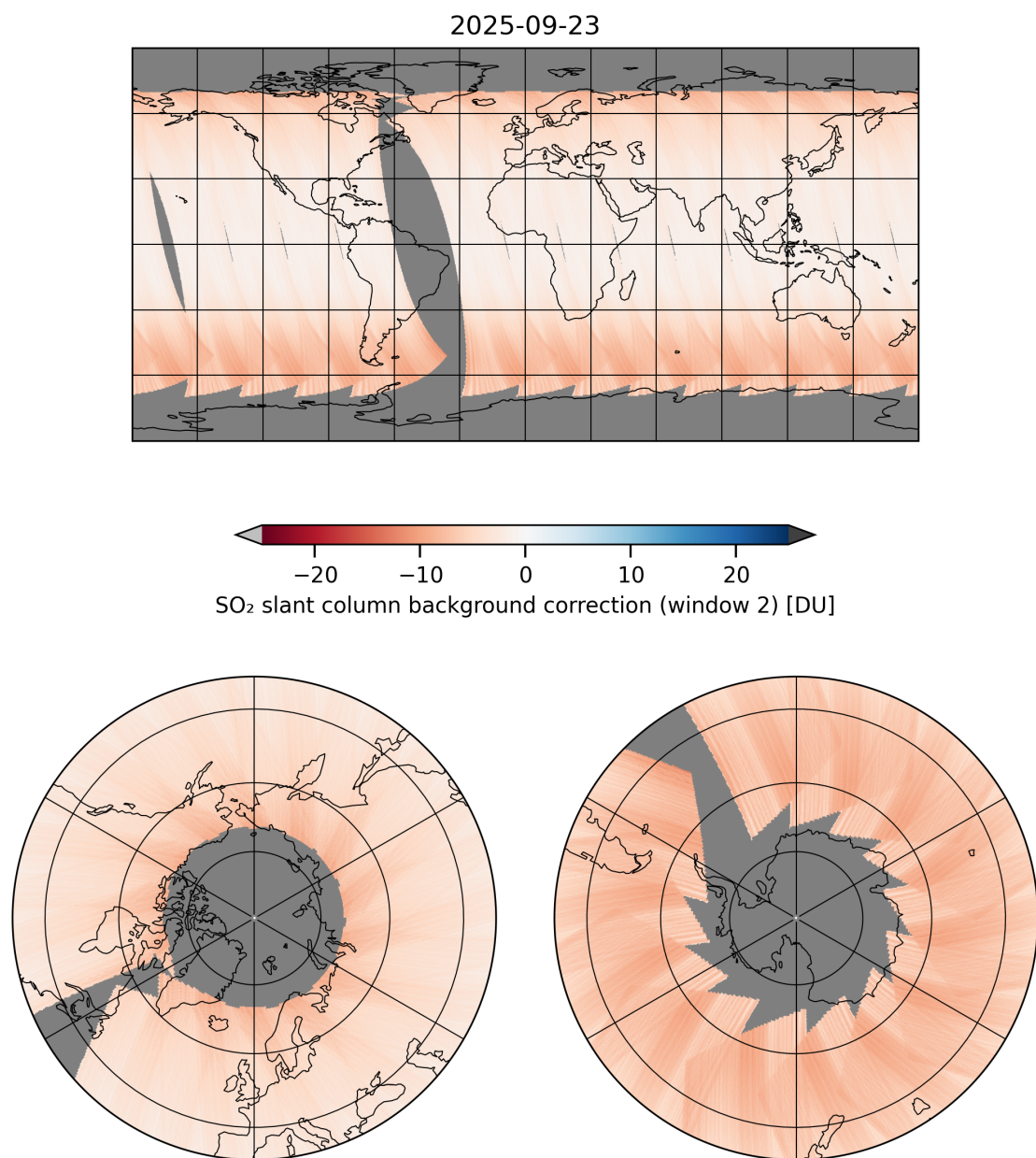


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-09-23 to 2025-09-23

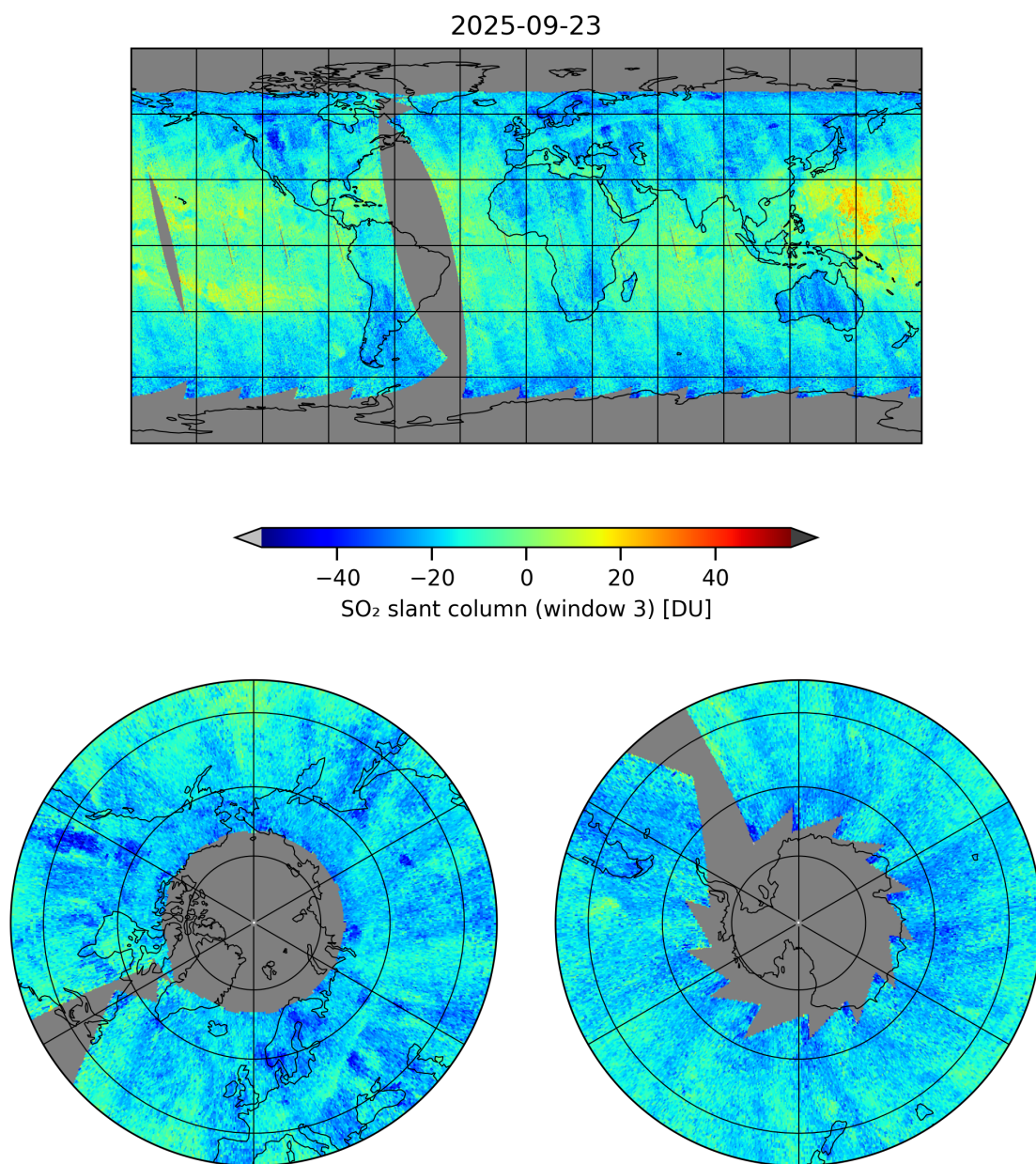


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-09-23 to 2025-09-23

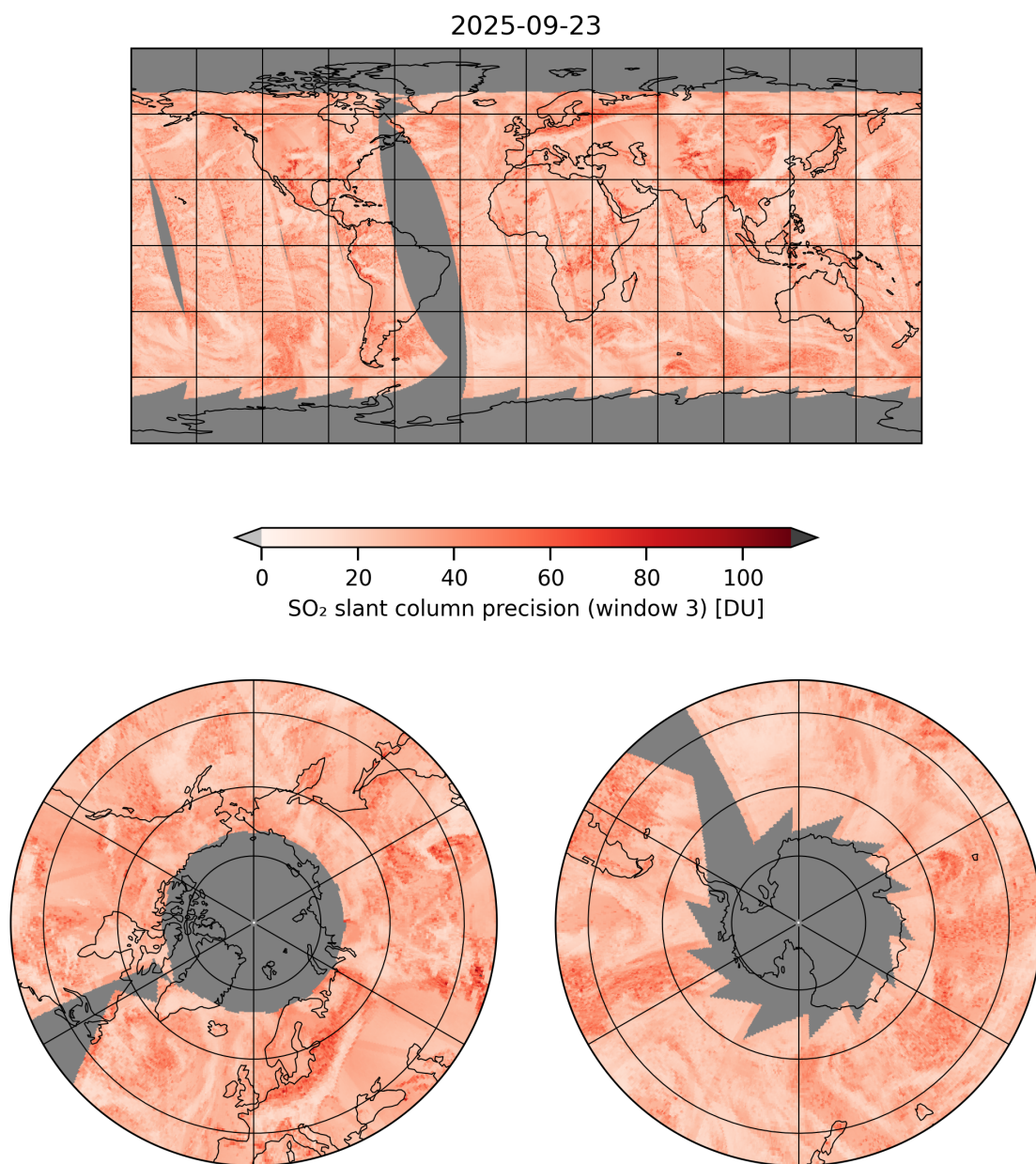


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-09-23 to 2025-09-23

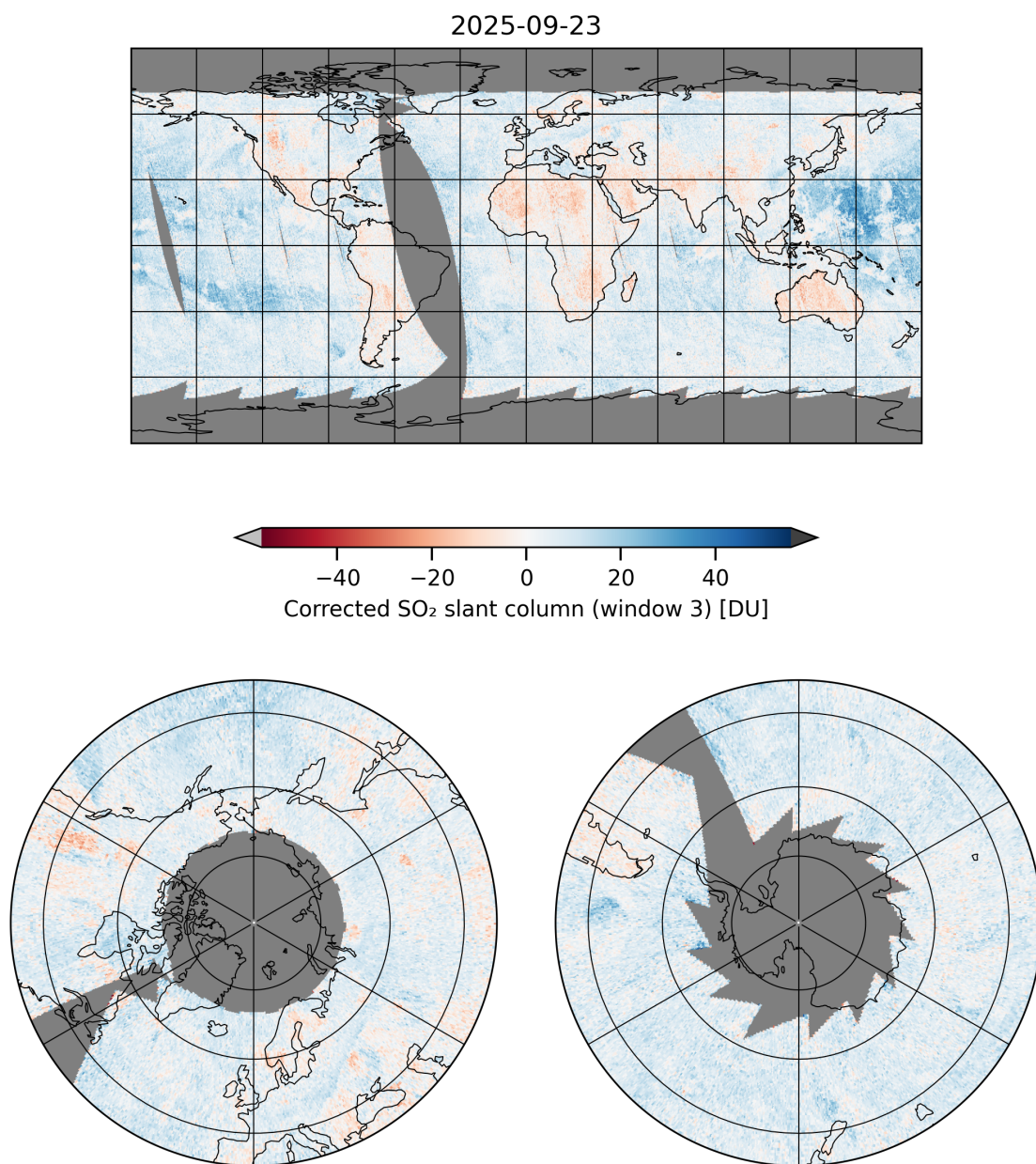


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-09-23 to 2025-09-23

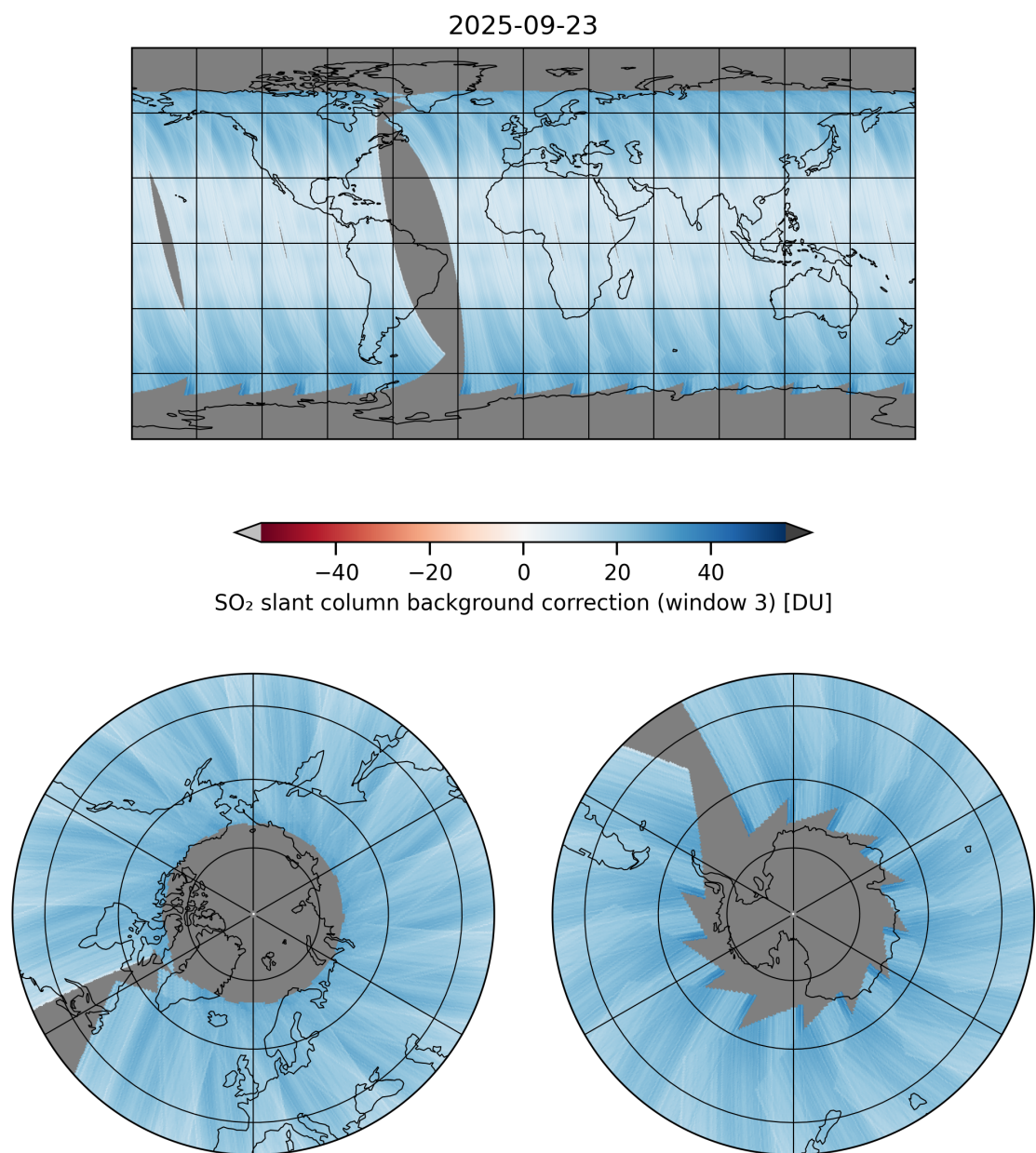


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-09-23 to 2025-09-23

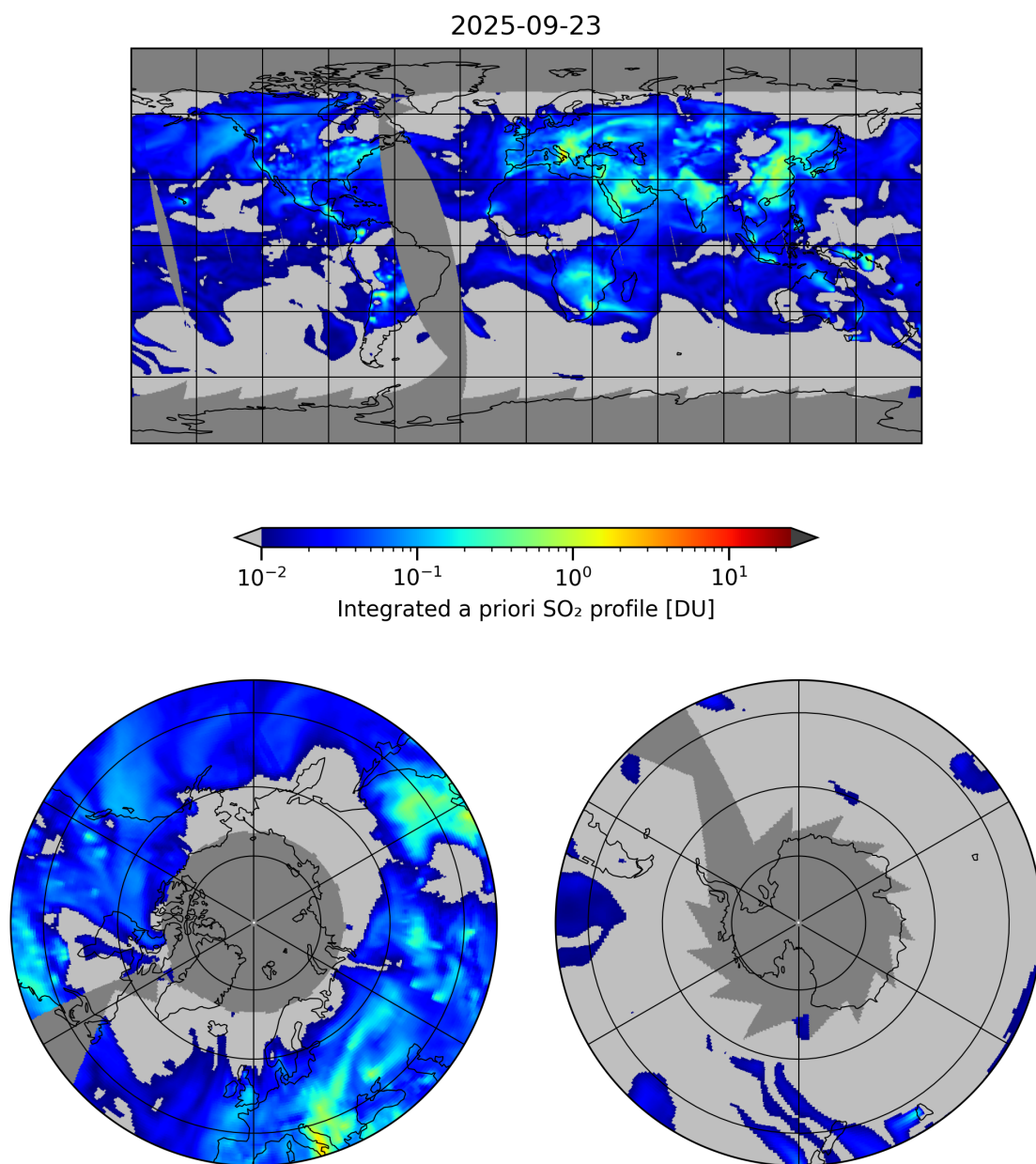


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-09-23 to 2025-09-23

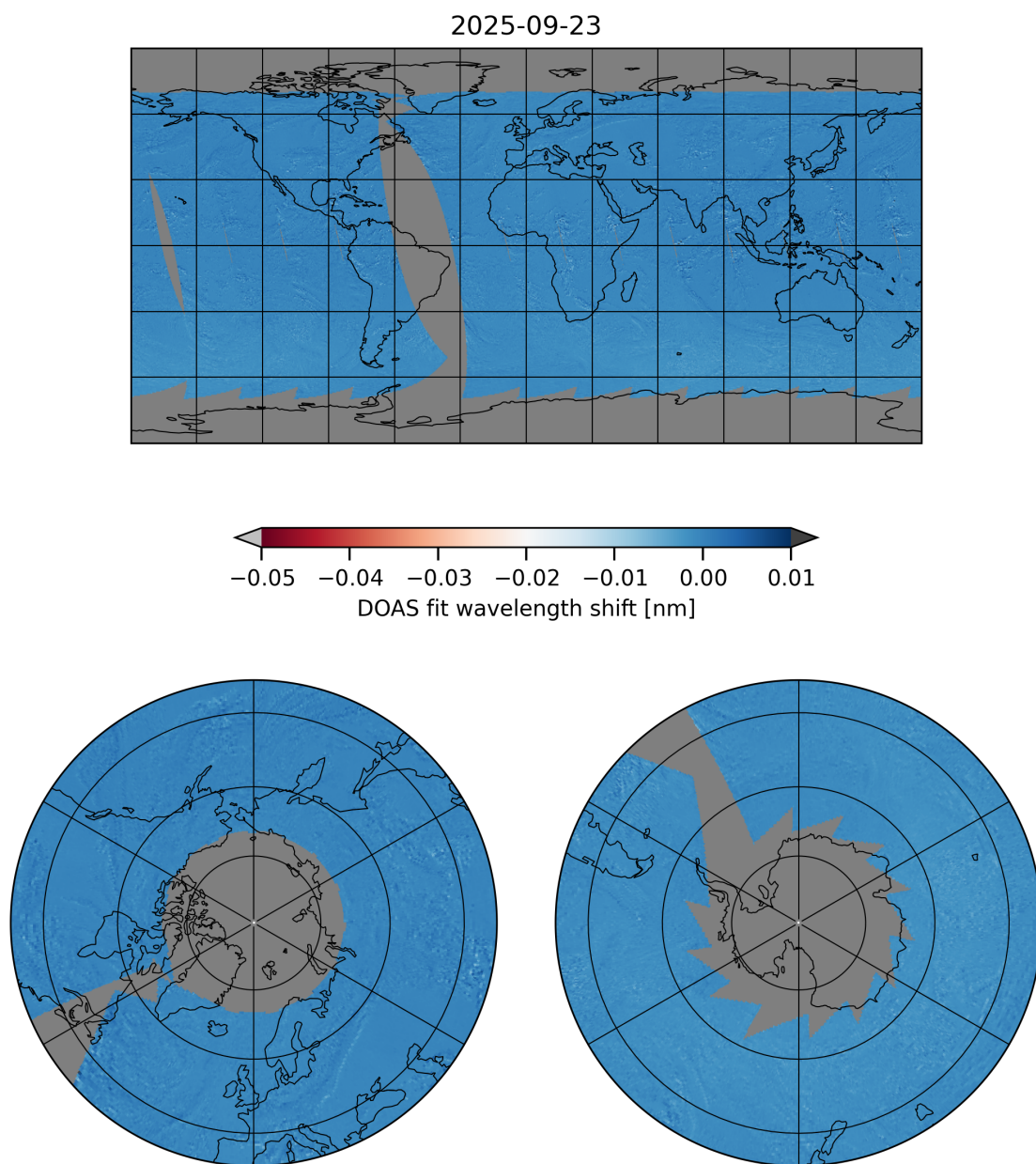


Figure 22: Map of “DOAS fit wavelength shift” for 2025-09-23 to 2025-09-23

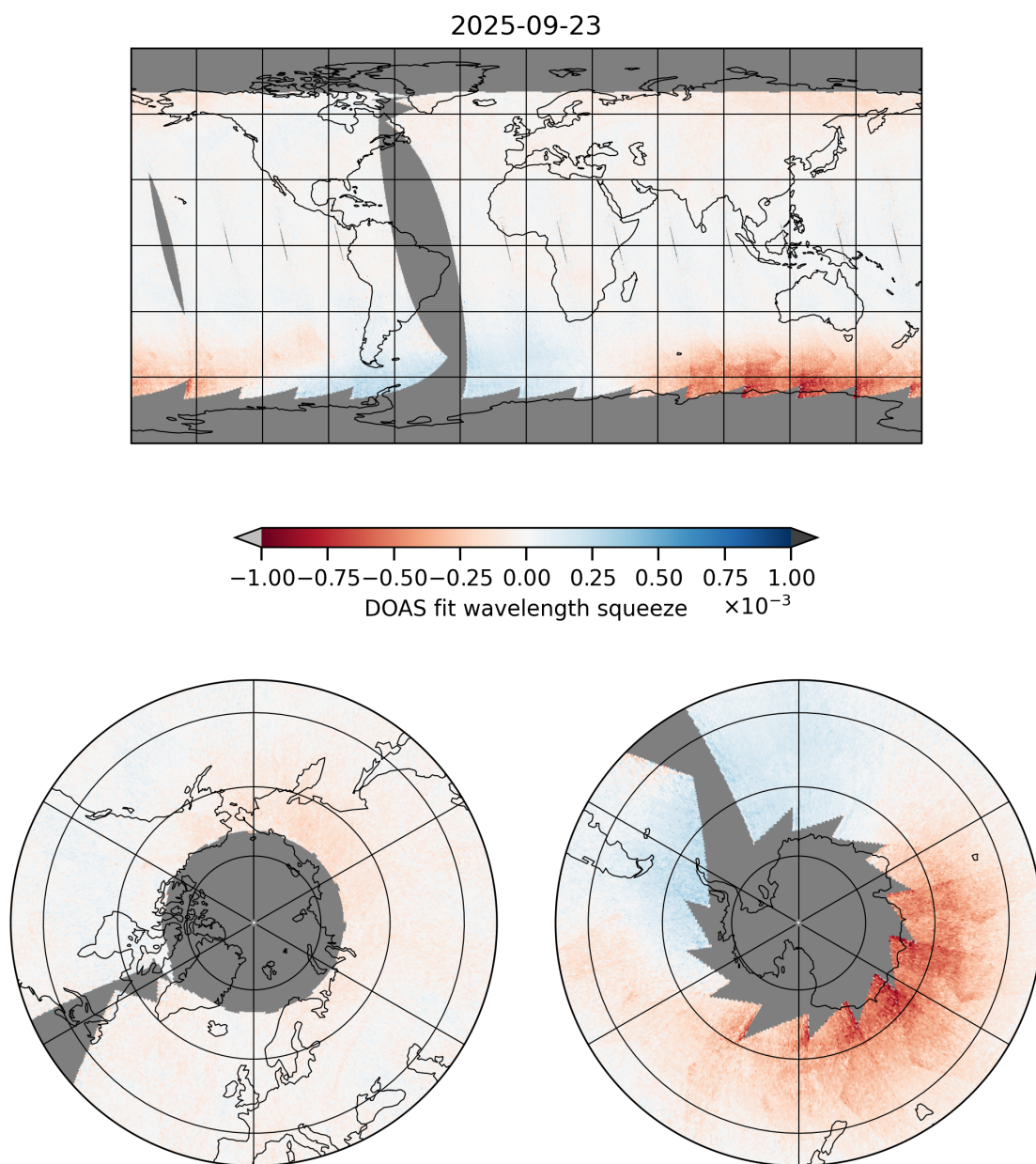


Figure 23: Map of "DOAS fit wavelength squeeze" for 2025-09-23 to 2025-09-23

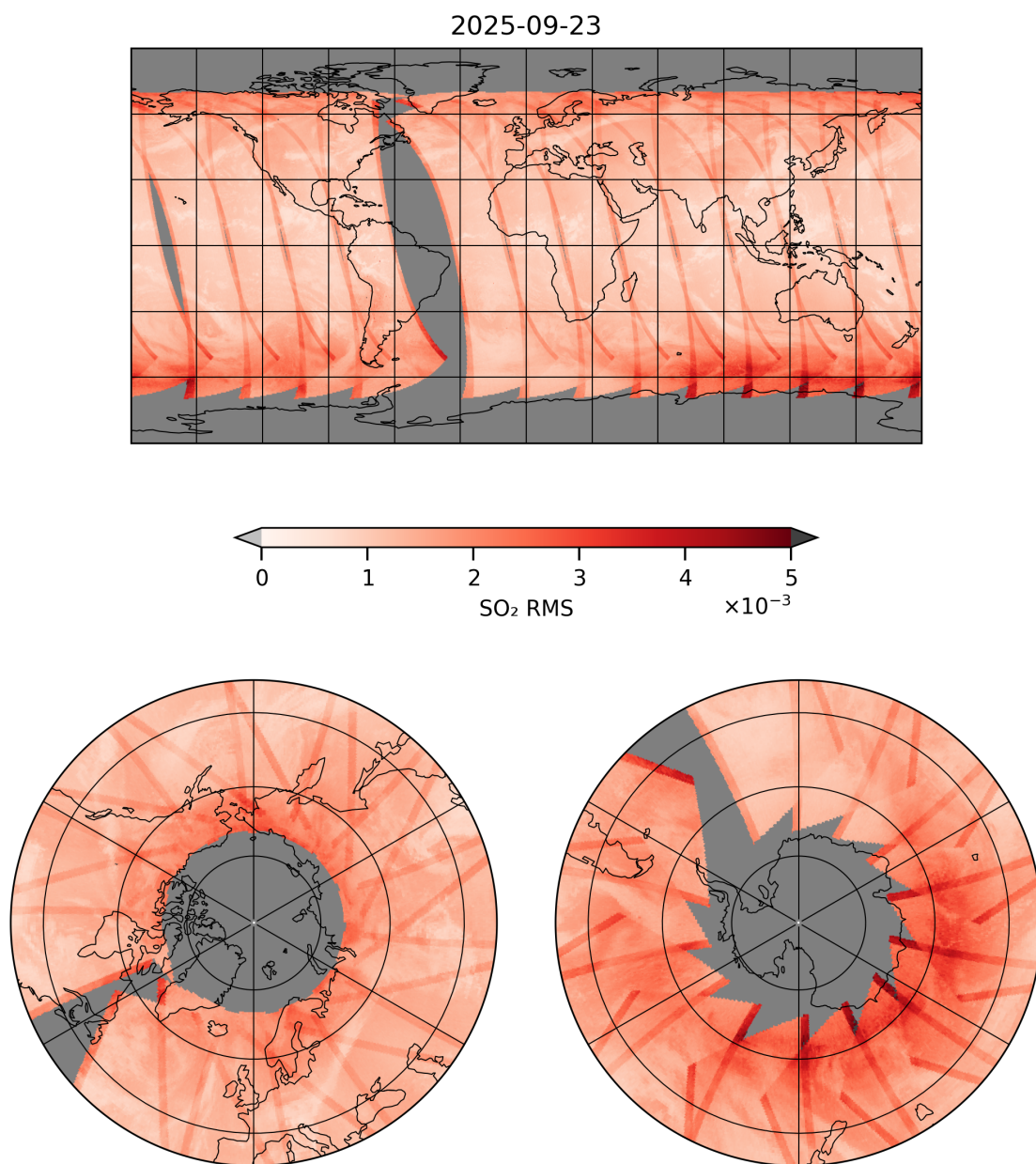


Figure 24: Map of “SO₂ RMS” for 2025-09-23 to 2025-09-23

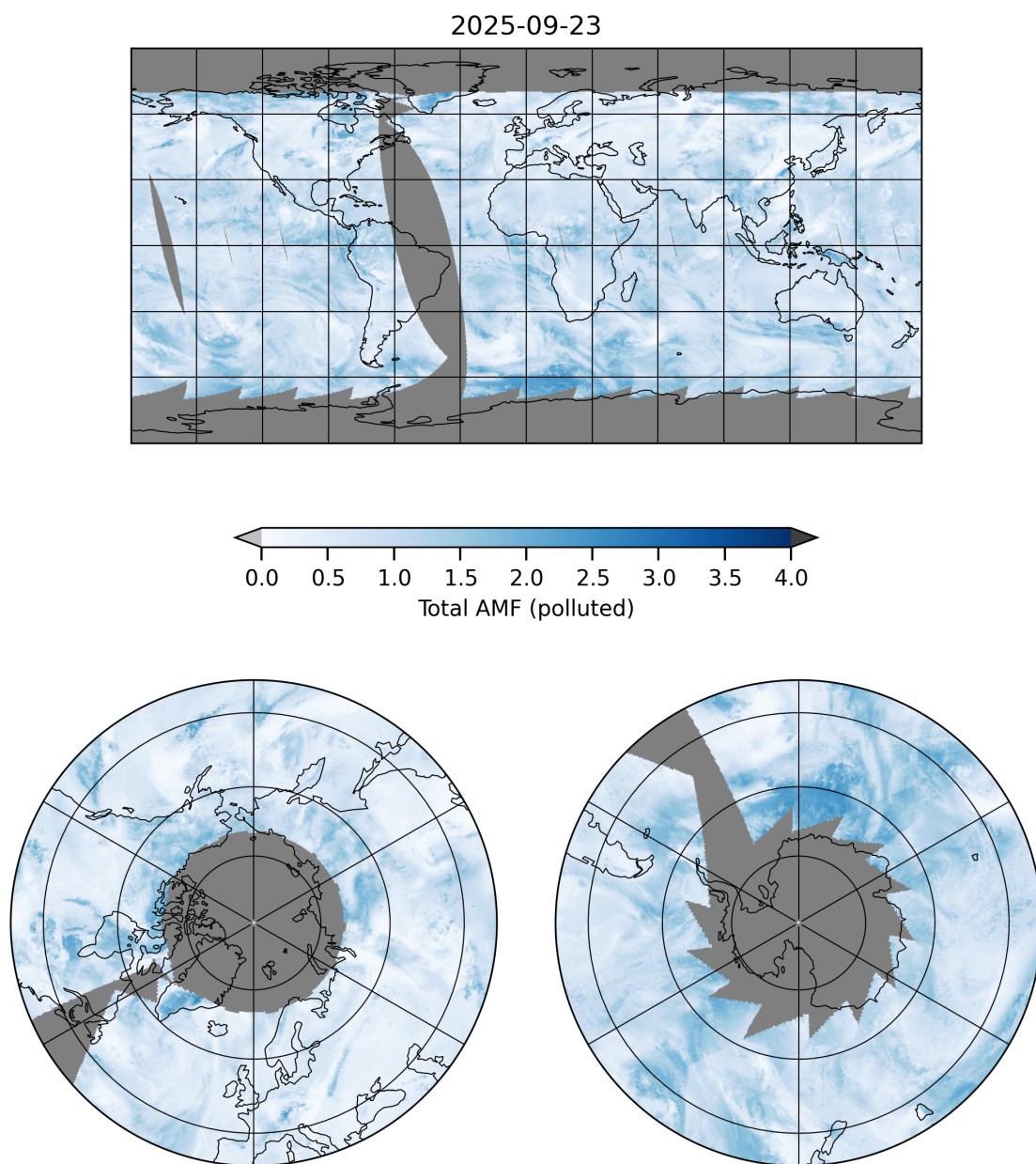


Figure 25: Map of “Total AMF (polluted)” for 2025-09-23 to 2025-09-23

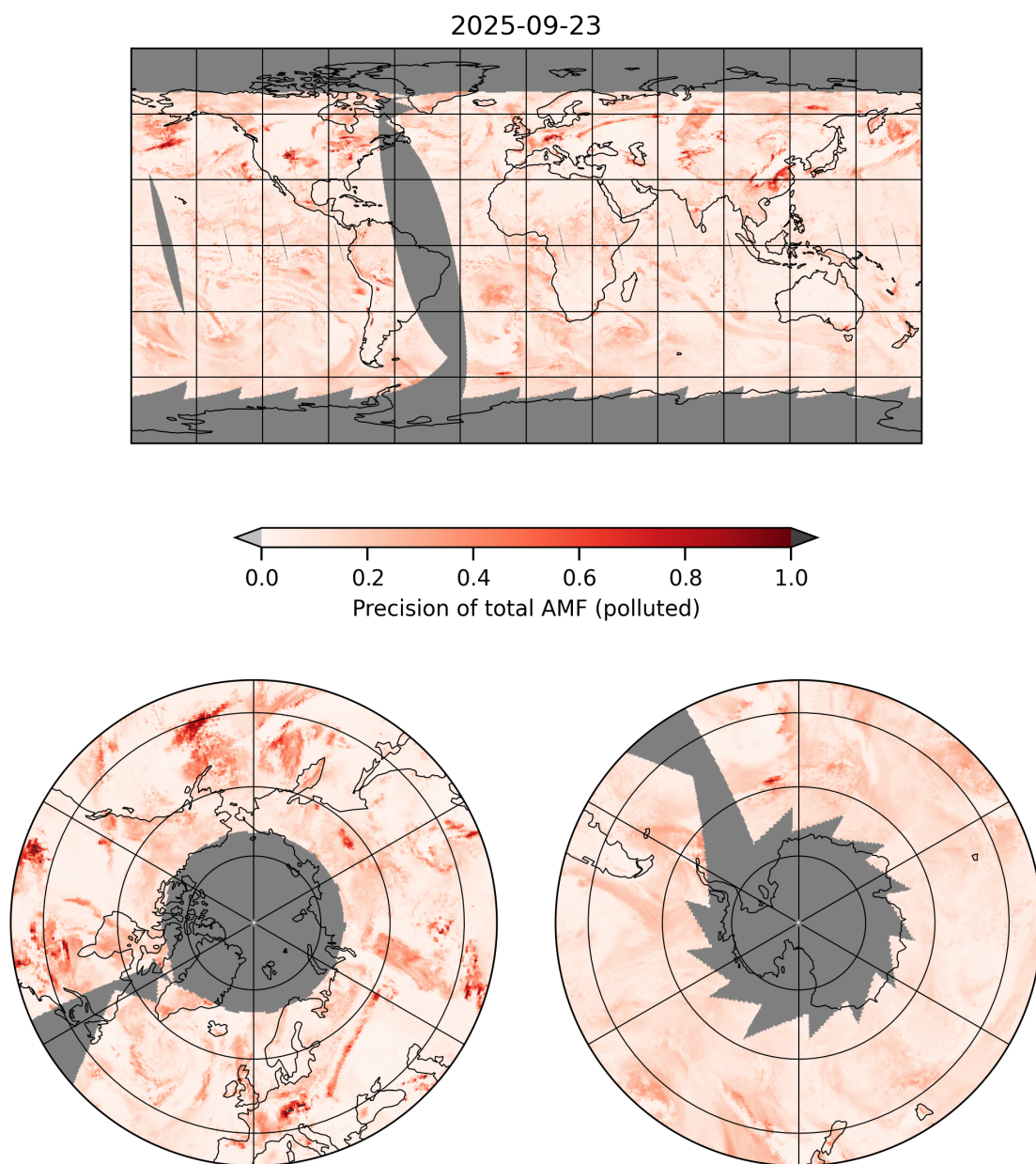


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-09-23 to 2025-09-23

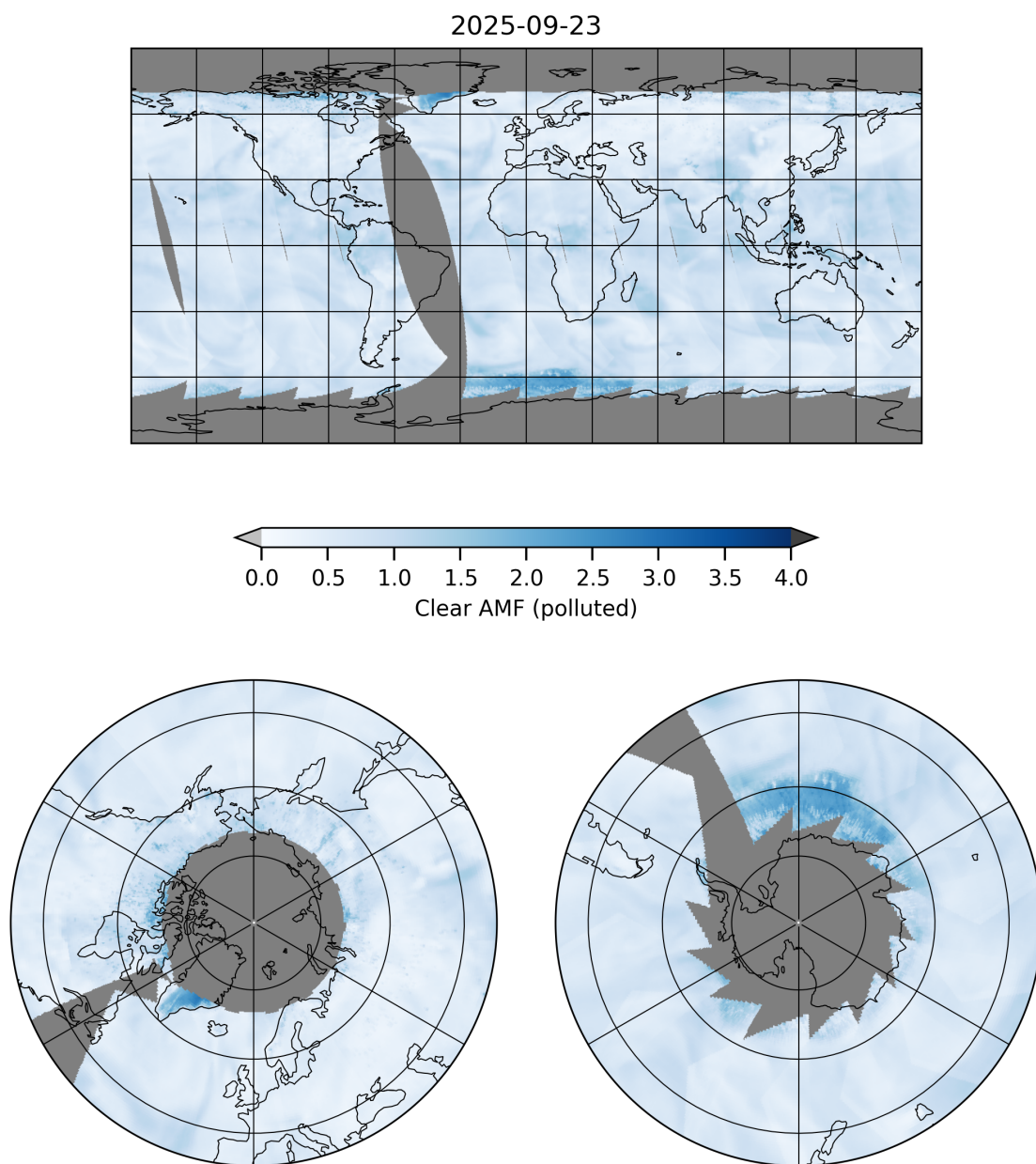


Figure 27: Map of “Clear AMF (polluted)” for 2025-09-23 to 2025-09-23

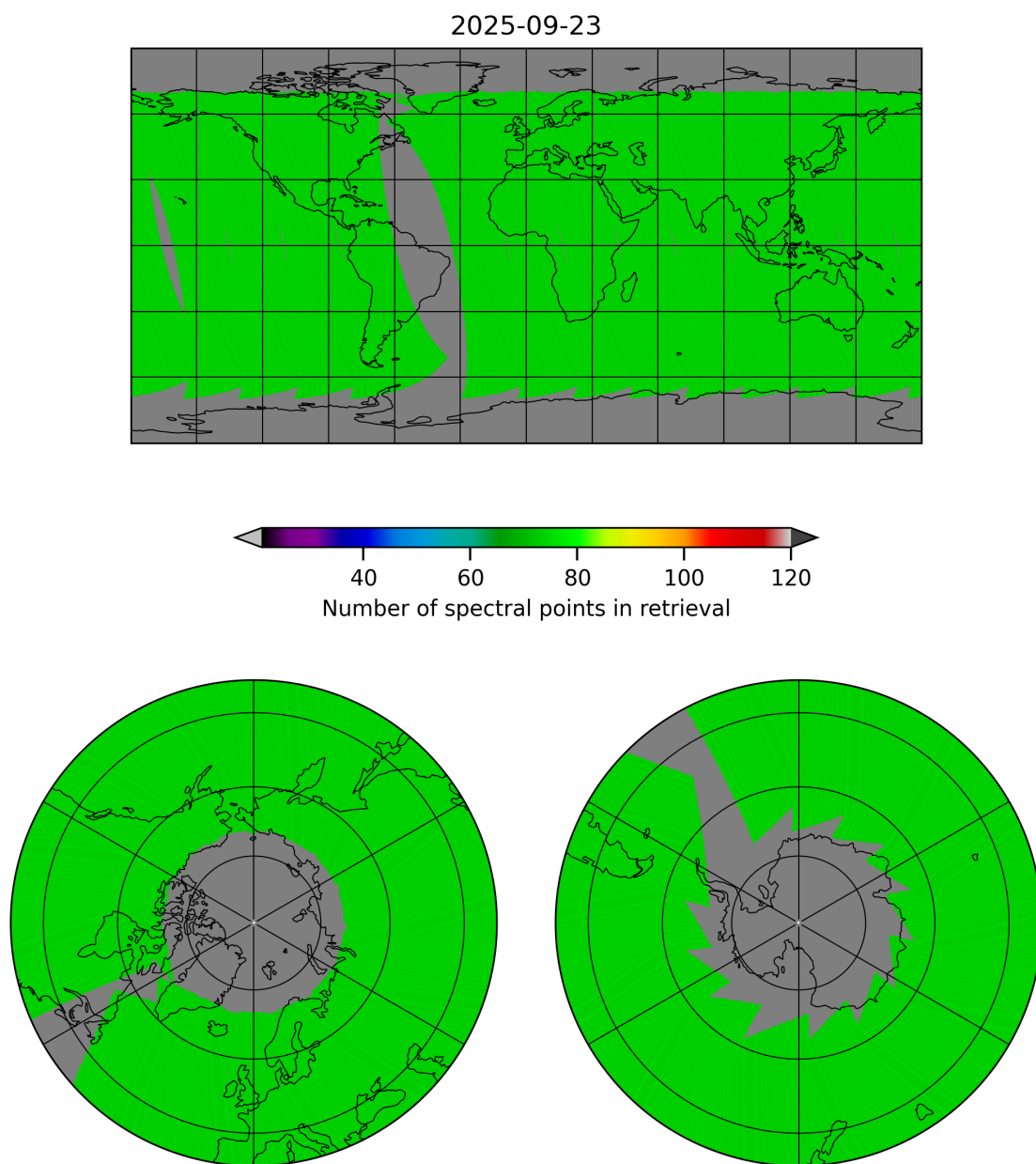


Figure 28: Map of “Number of spectral points in retrieval” for 2025-09-23 to 2025-09-23

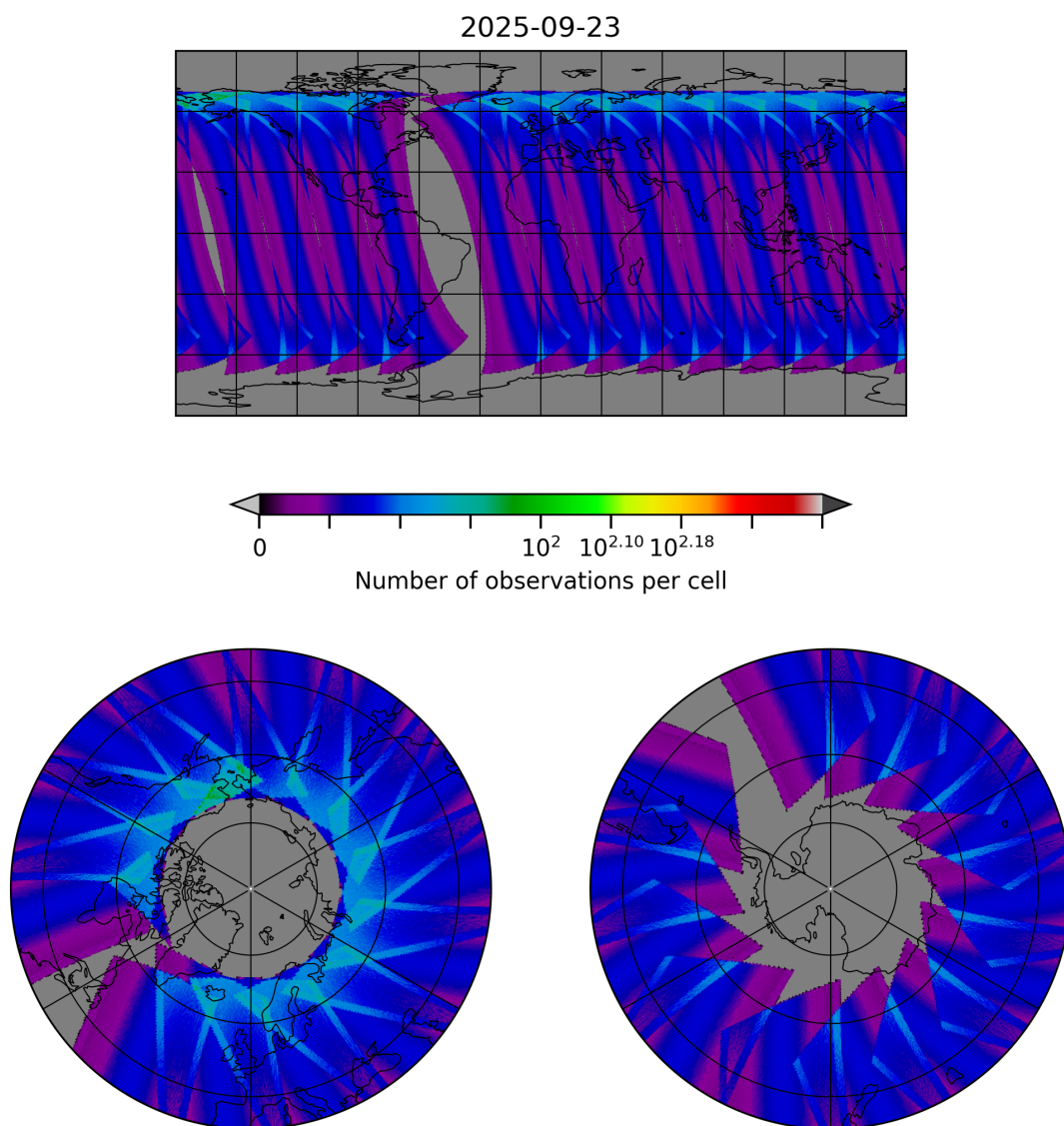


Figure 29: Map of the number of observations for 2025-09-23 to 2025-09-23

7 Zonal average

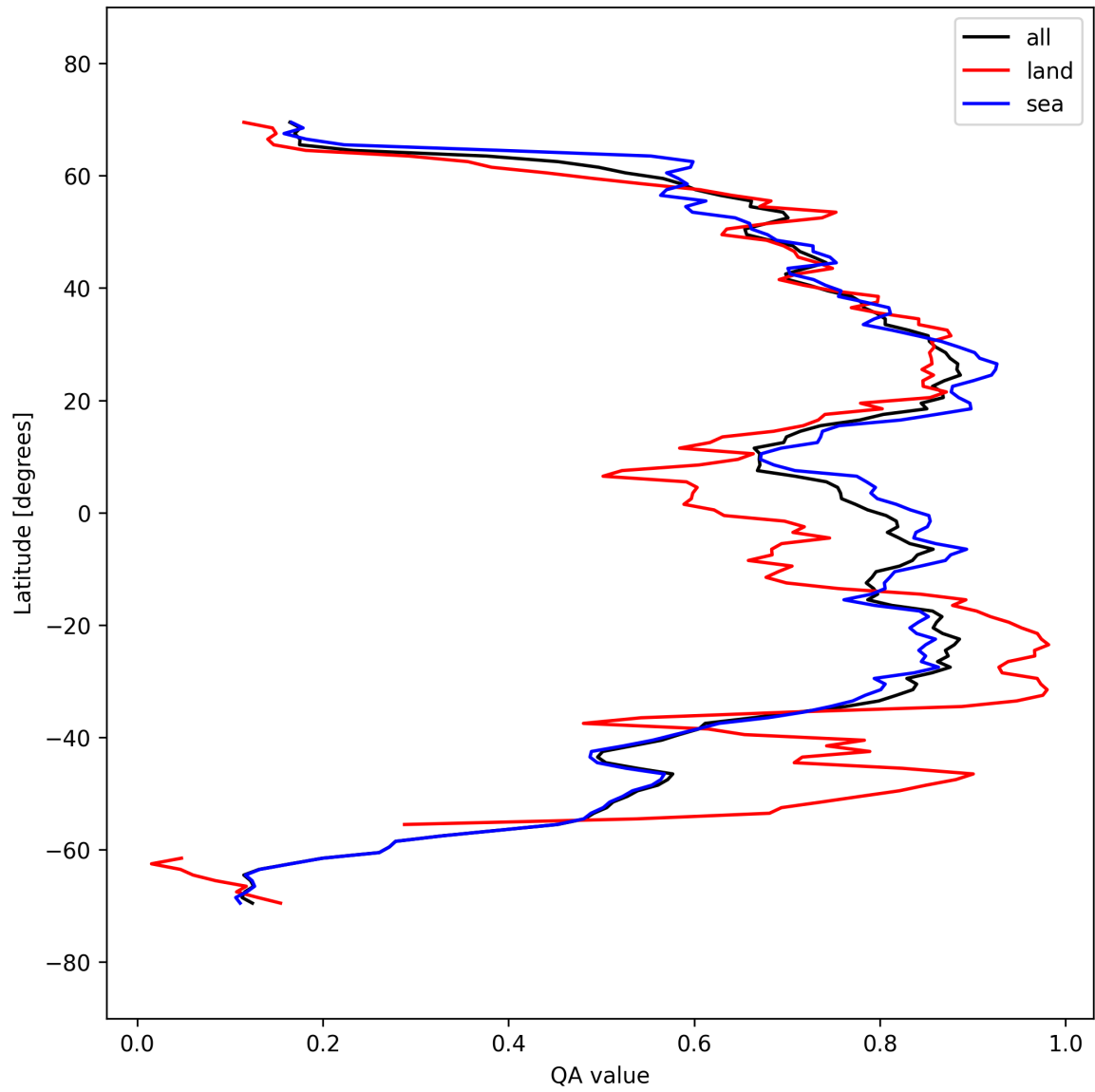


Figure 30: Zonal average of “QA value” for 2025-09-23 to 2025-09-23.

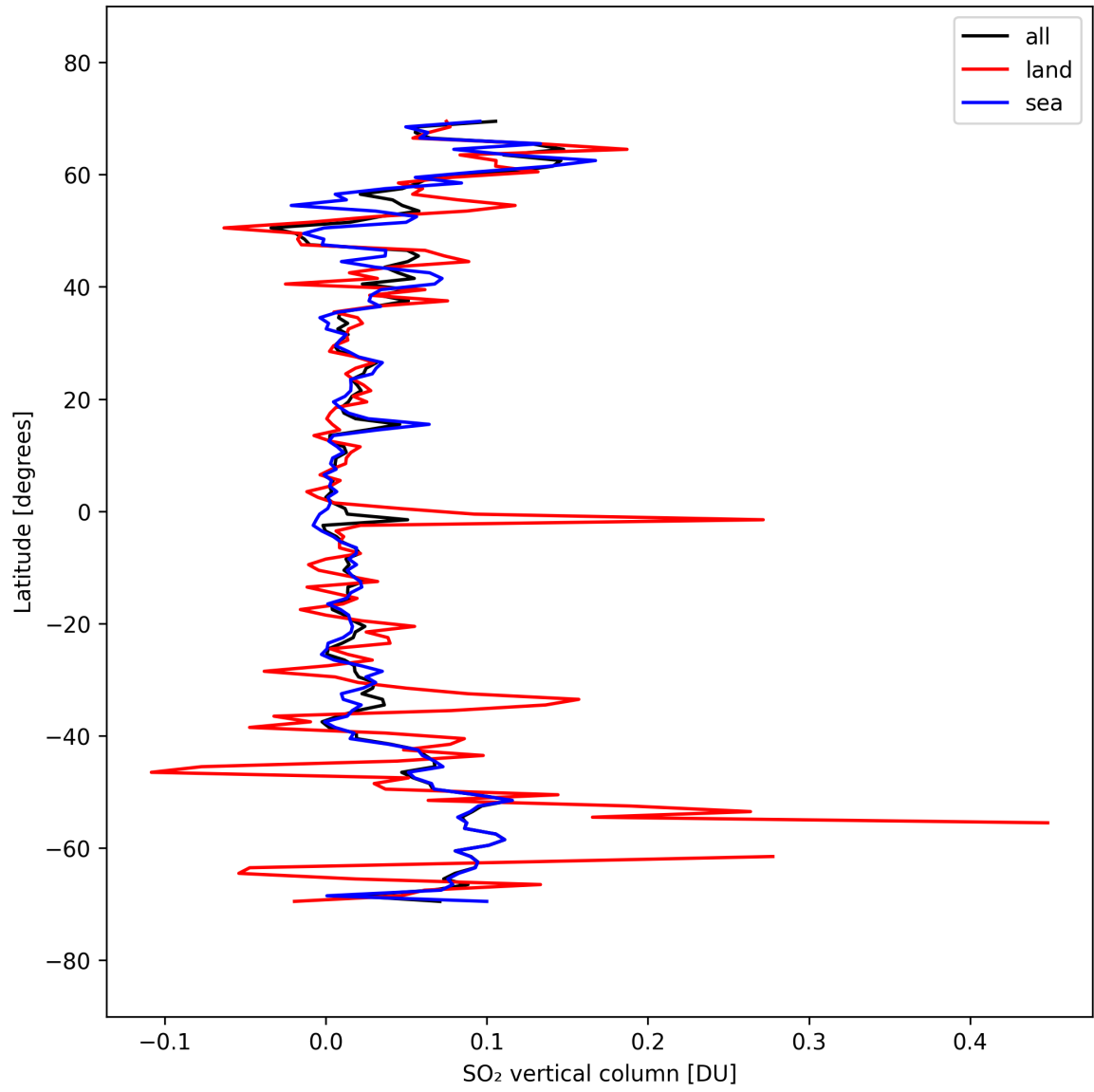


Figure 31: Zonal average of “SO₂ vertical column” for 2025-09-23 to 2025-09-23.

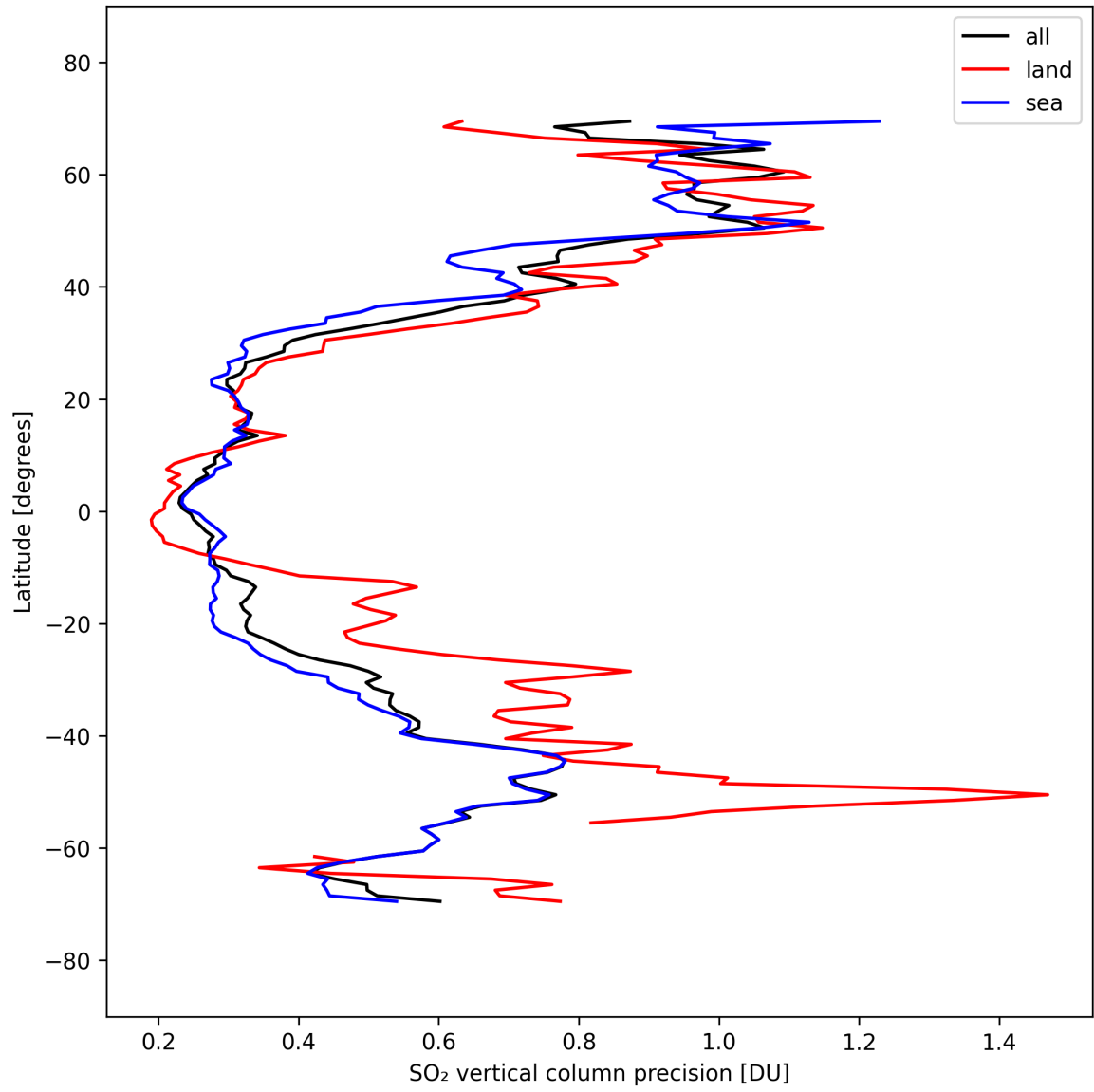


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-09-23 to 2025-09-23.

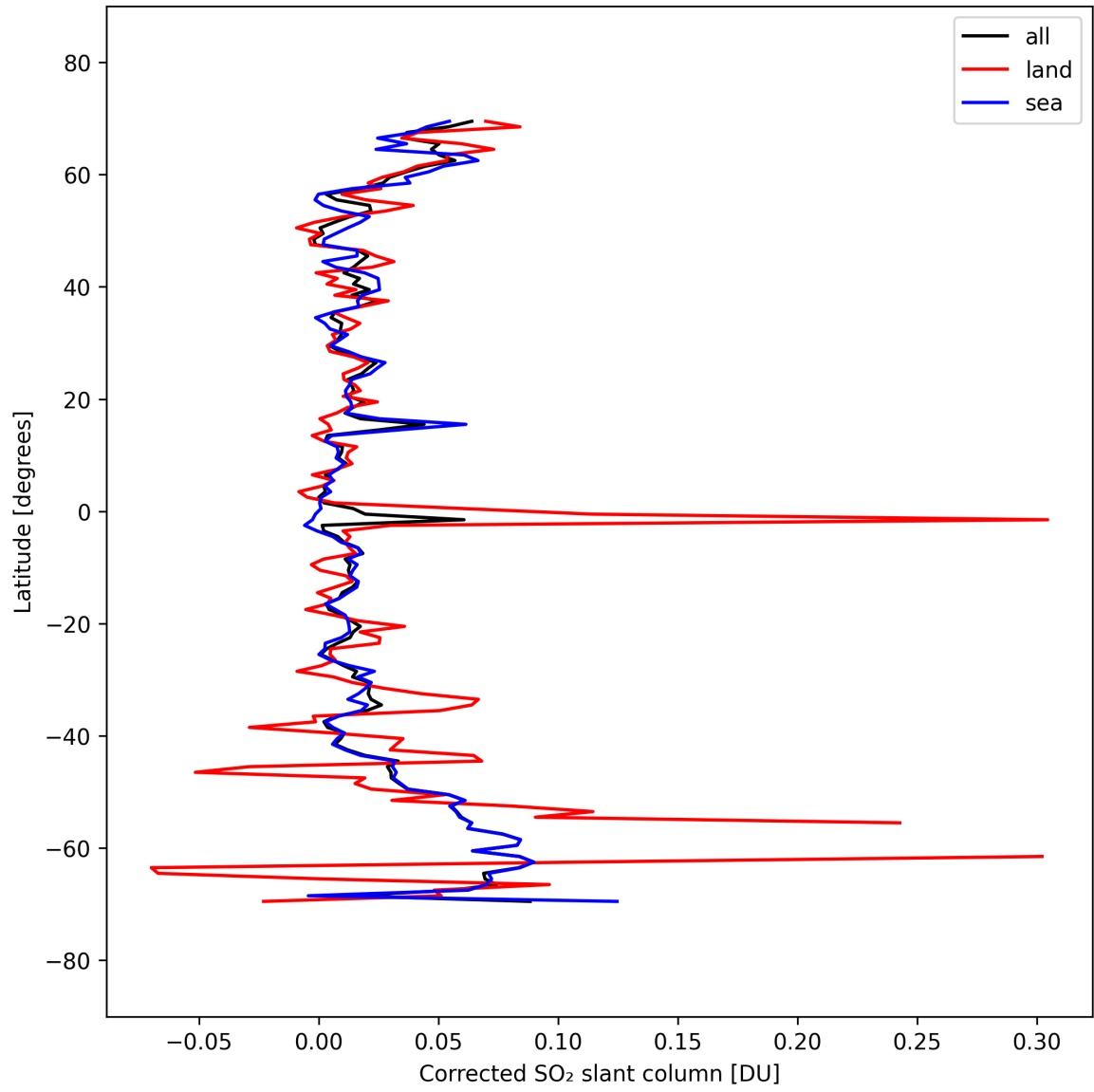


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-09-23 to 2025-09-23.

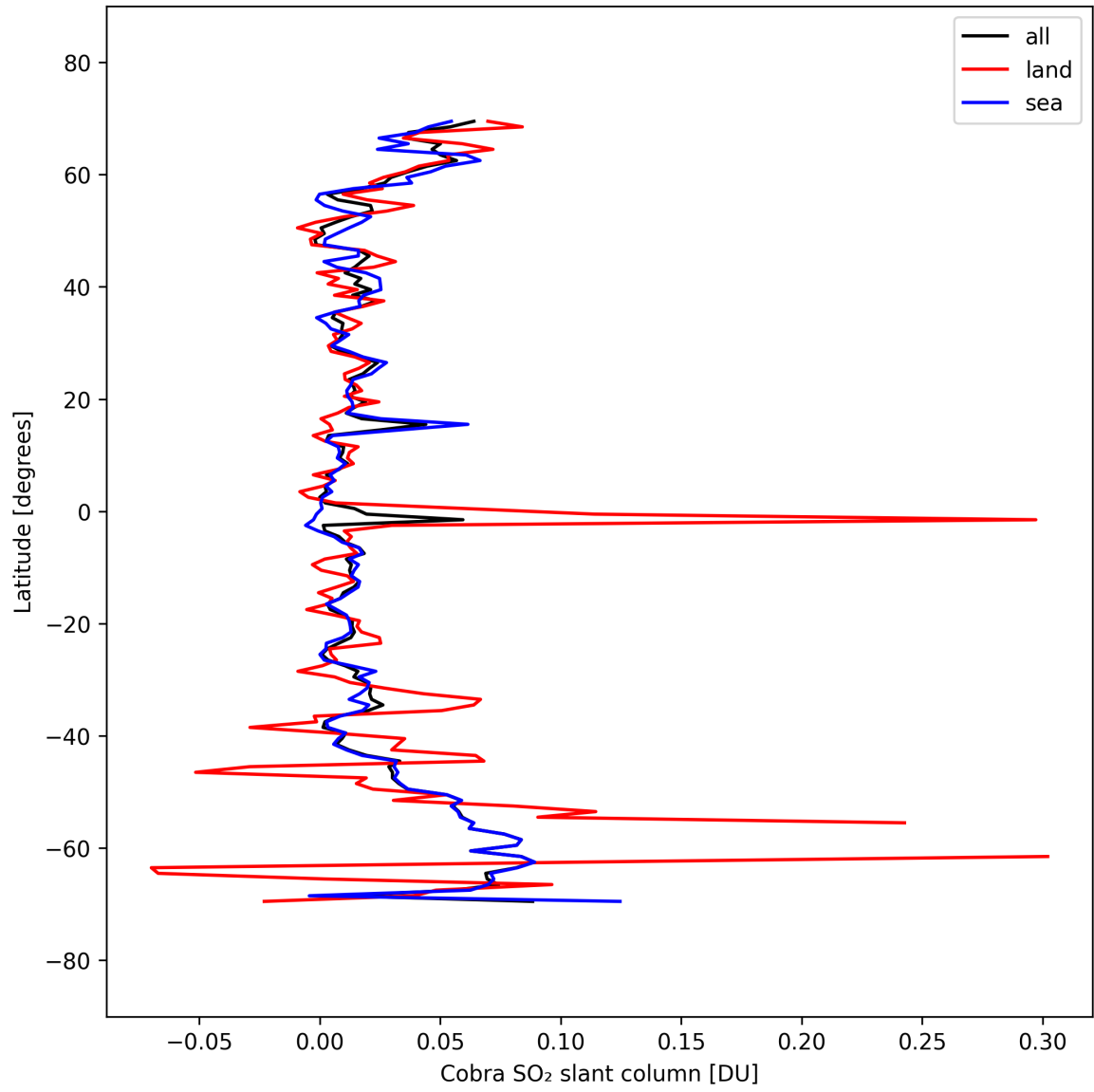


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-09-23 to 2025-09-23.

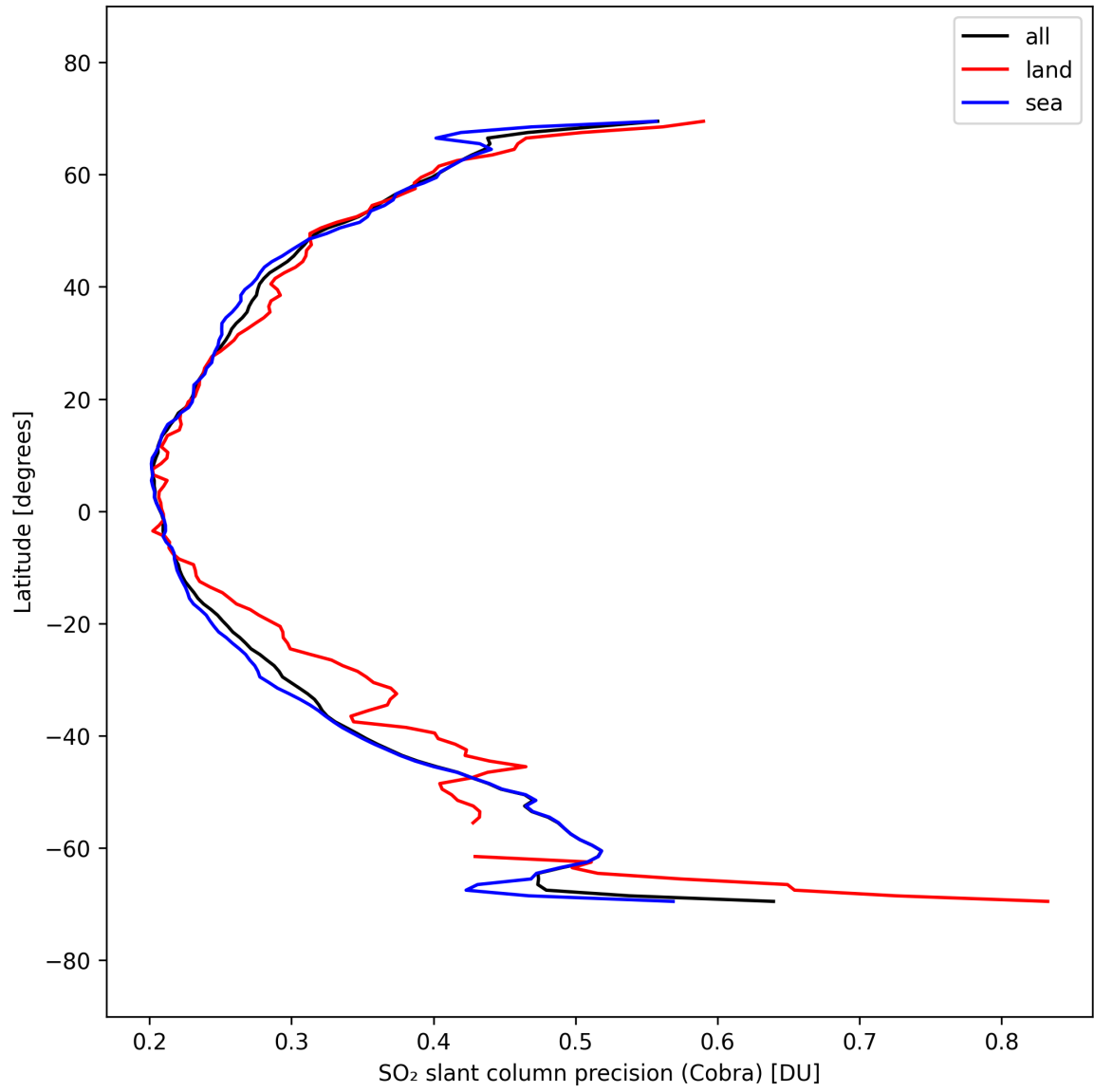


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-09-23 to 2025-09-23.

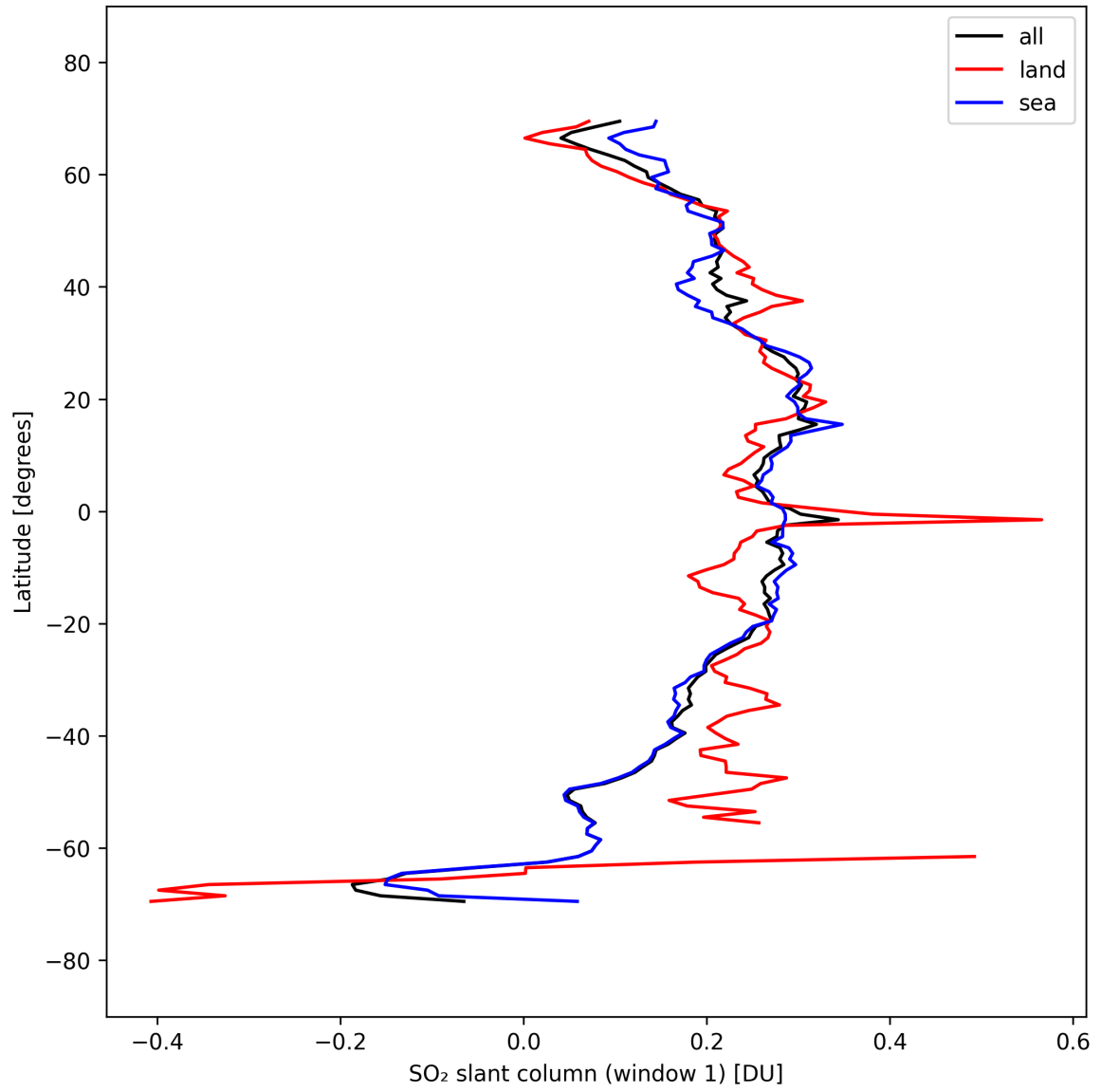


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-09-23 to 2025-09-23.

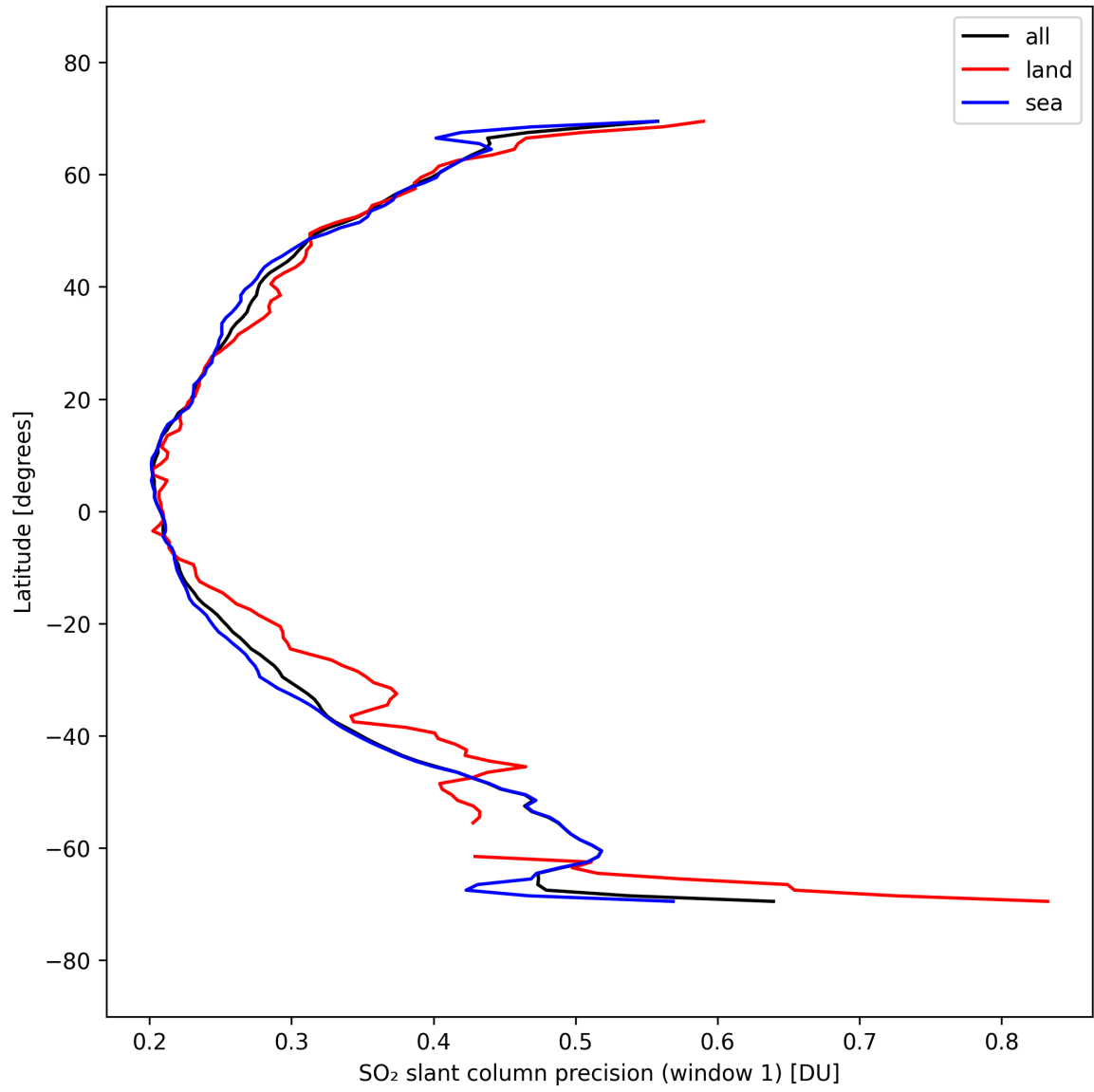


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-09-23 to 2025-09-23.

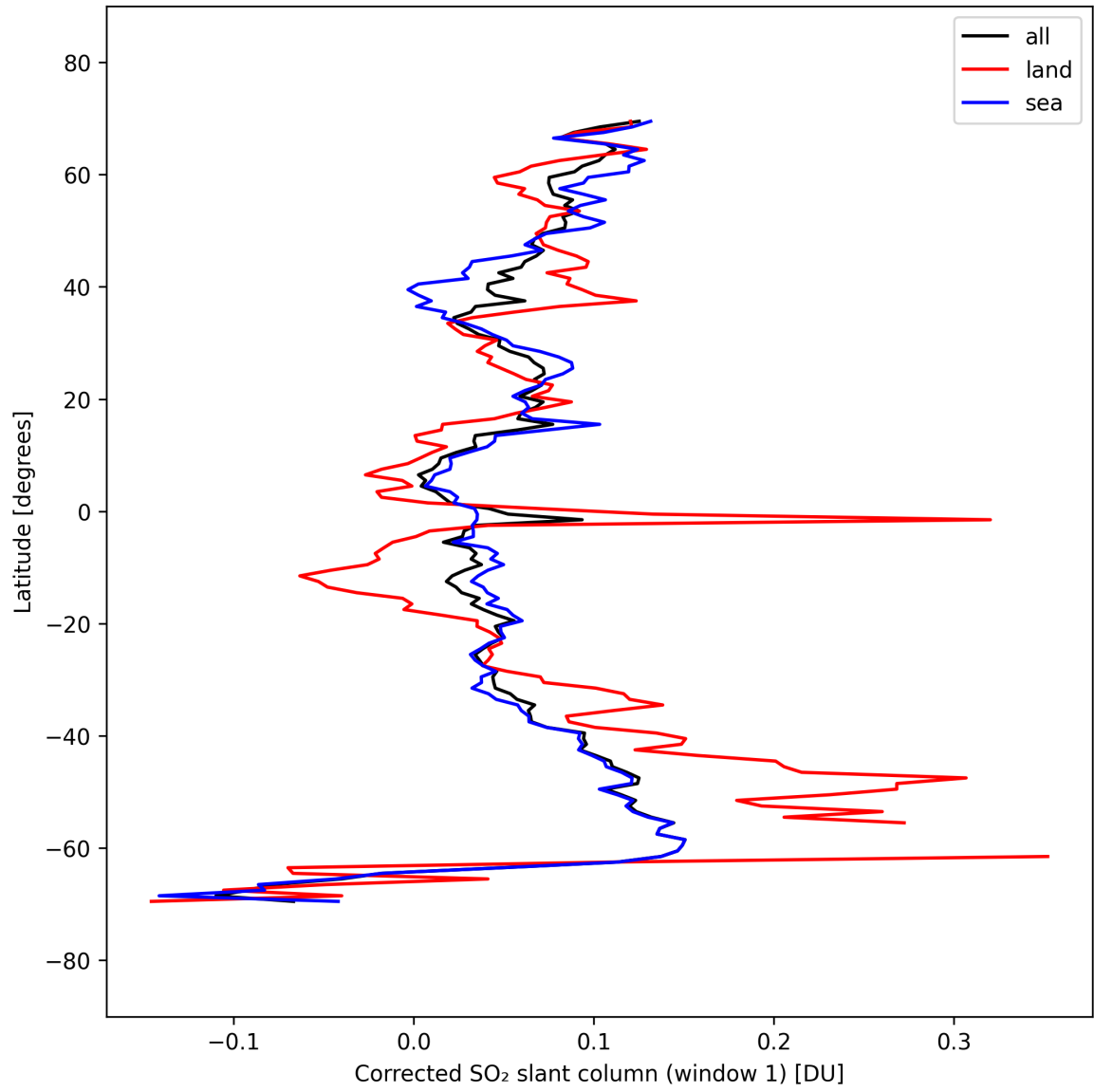


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-09-23 to 2025-09-23.

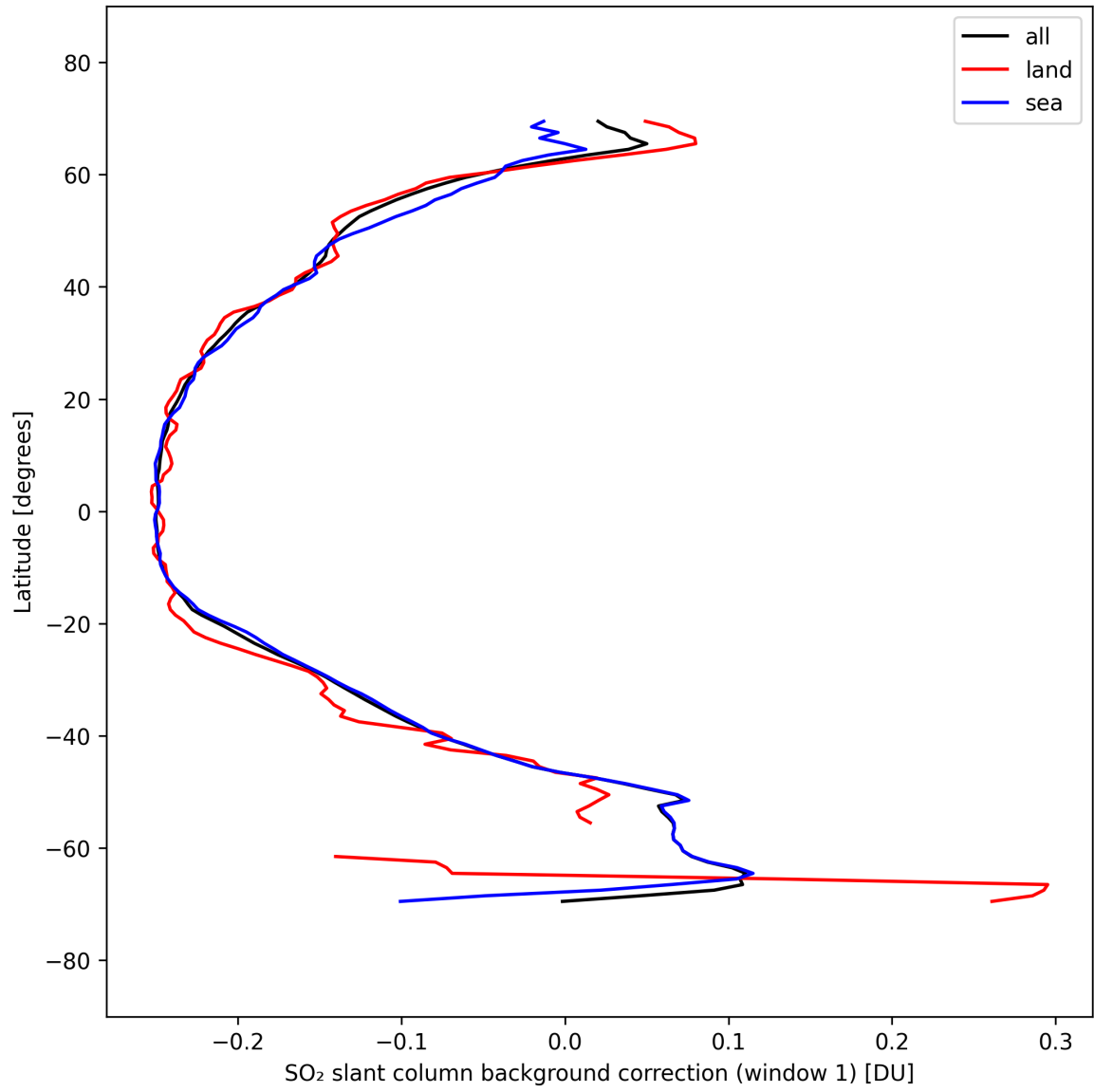


Figure 39: Zonal average of "SO₂ slant column background correction (window 1)" for 2025-09-23 to 2025-09-23.

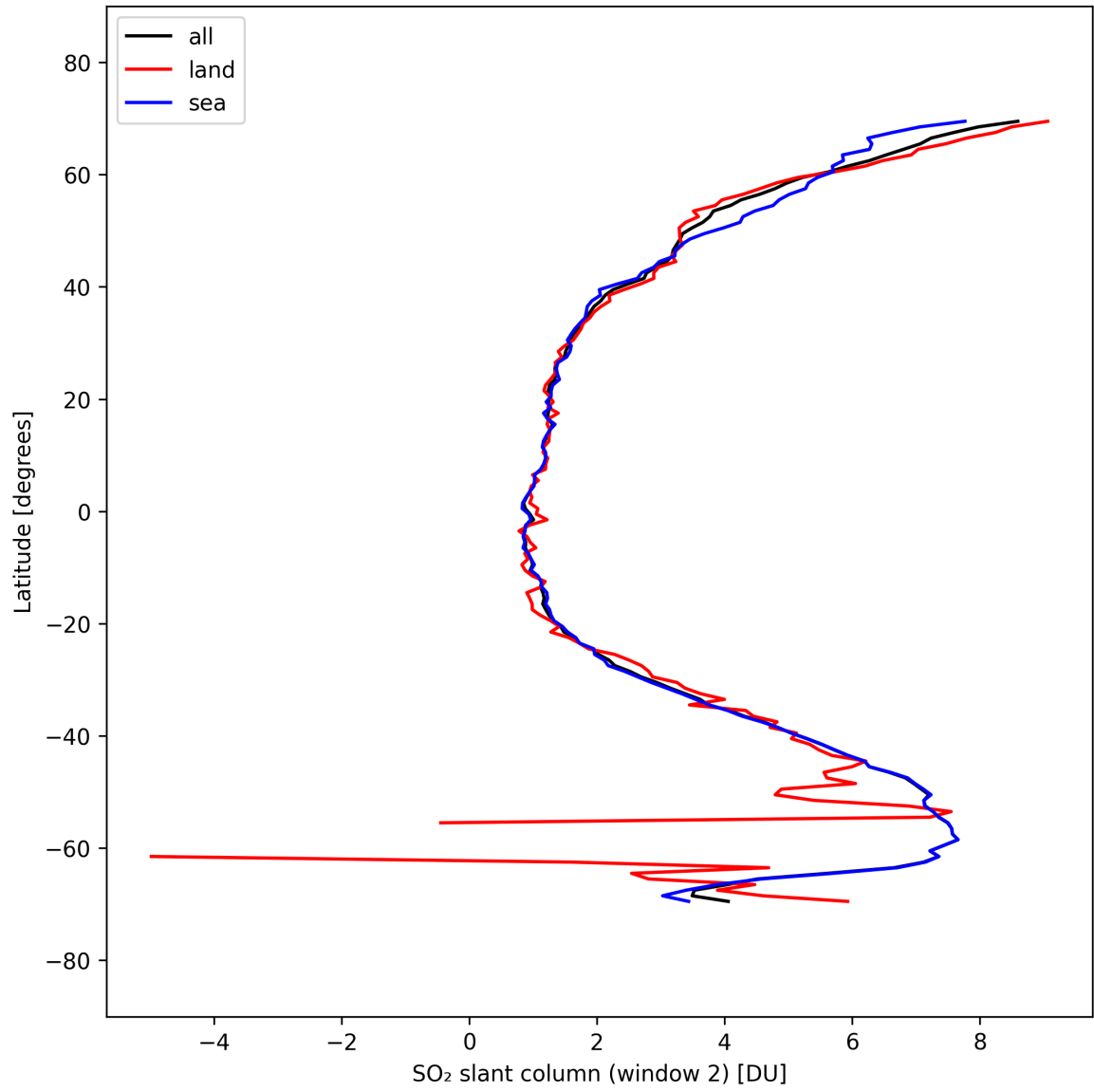


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-09-23 to 2025-09-23.

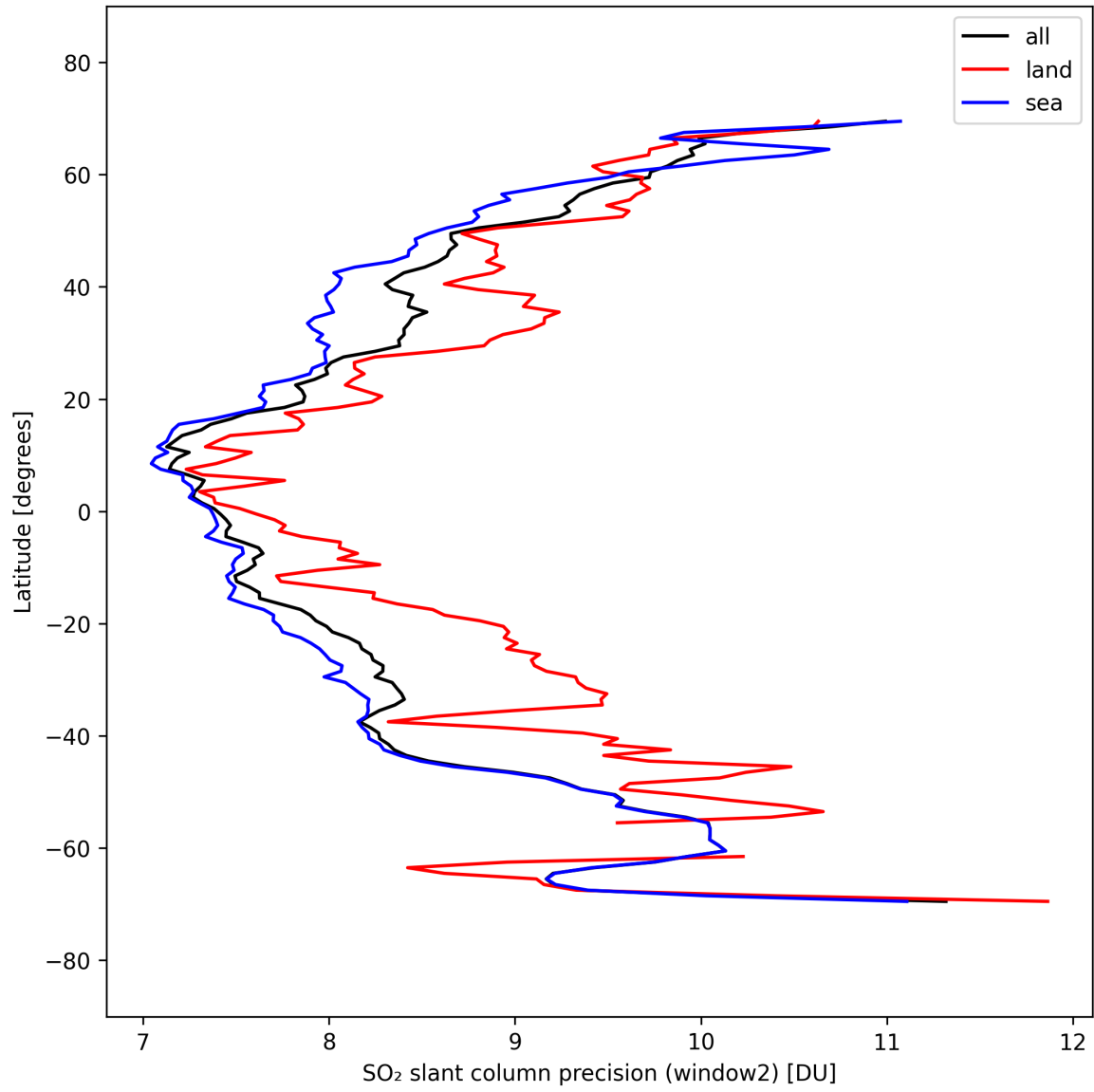


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-09-23 to 2025-09-23.

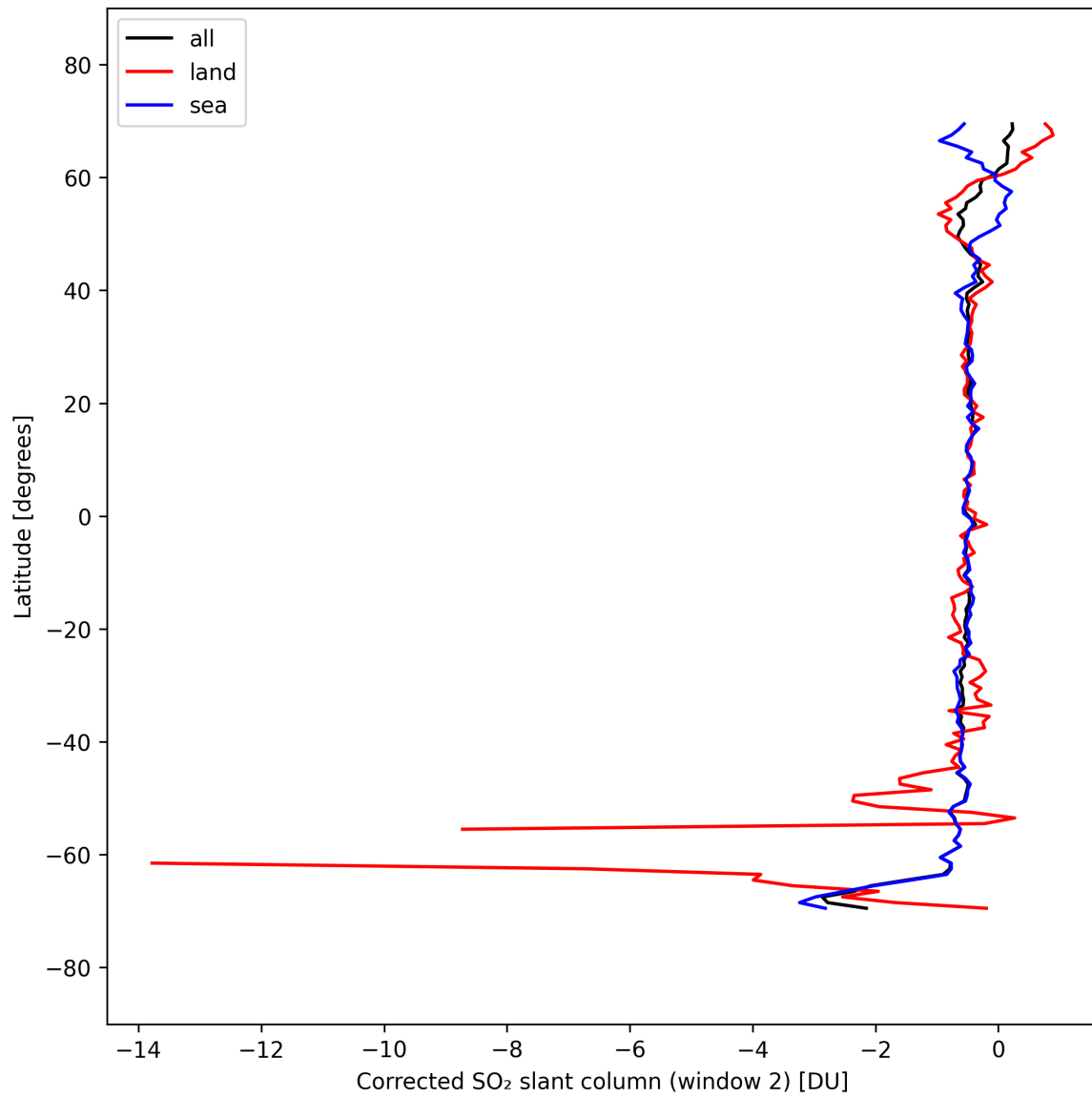


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-09-23 to 2025-09-23.

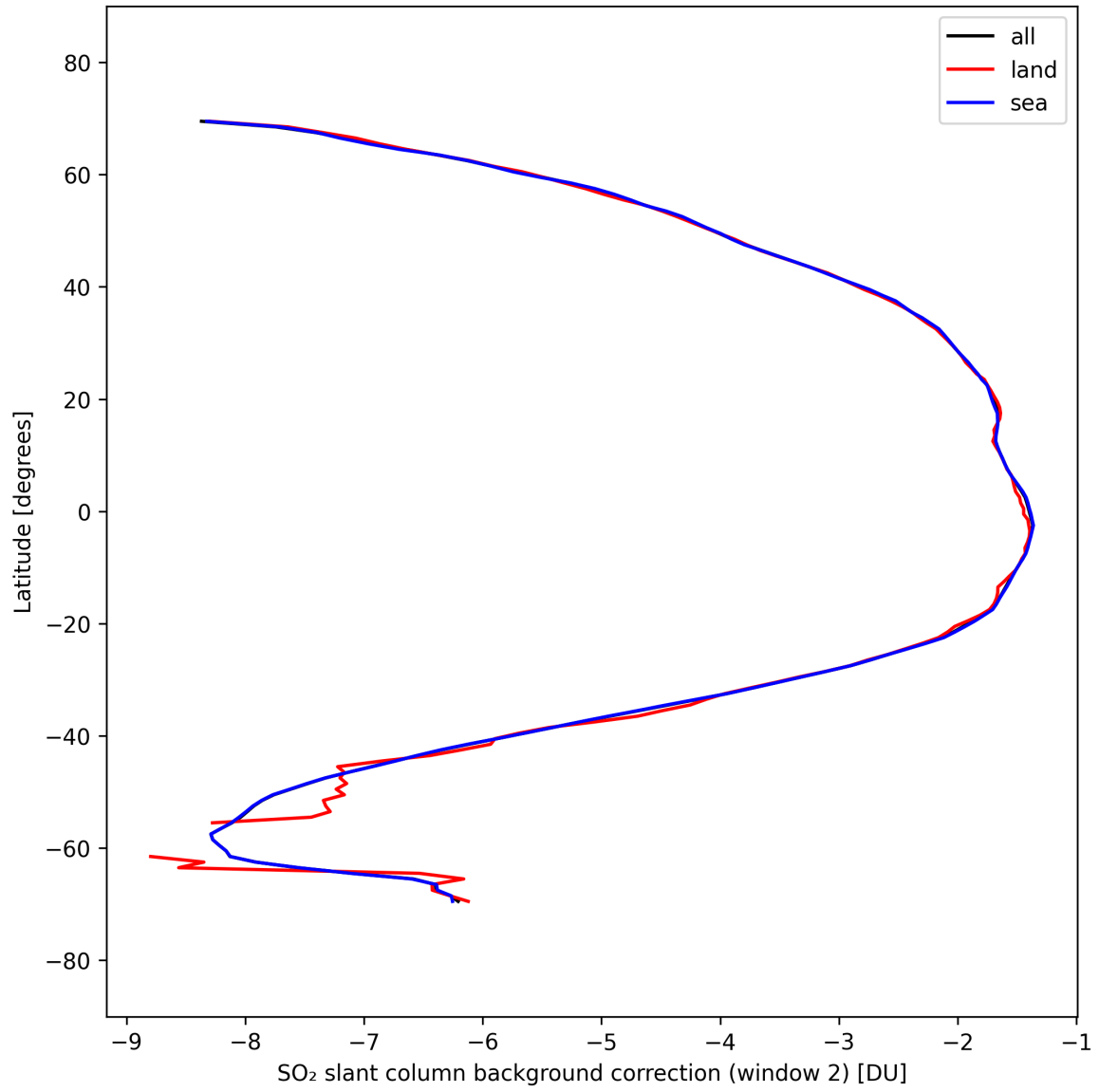


Figure 43: Zonal average of "SO₂ slant column background correction (window 2)" for 2025-09-23 to 2025-09-23.

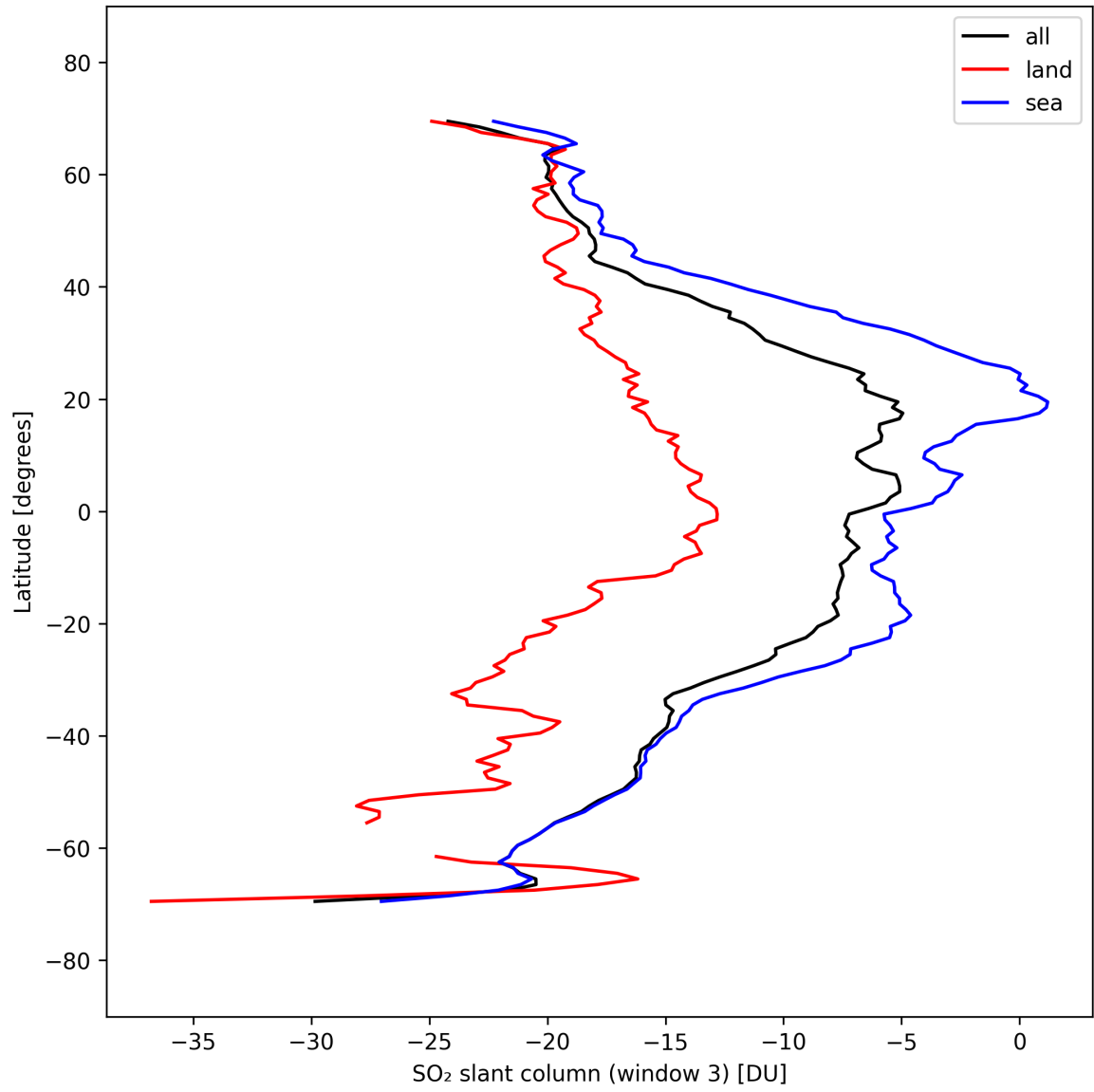


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-09-23 to 2025-09-23.

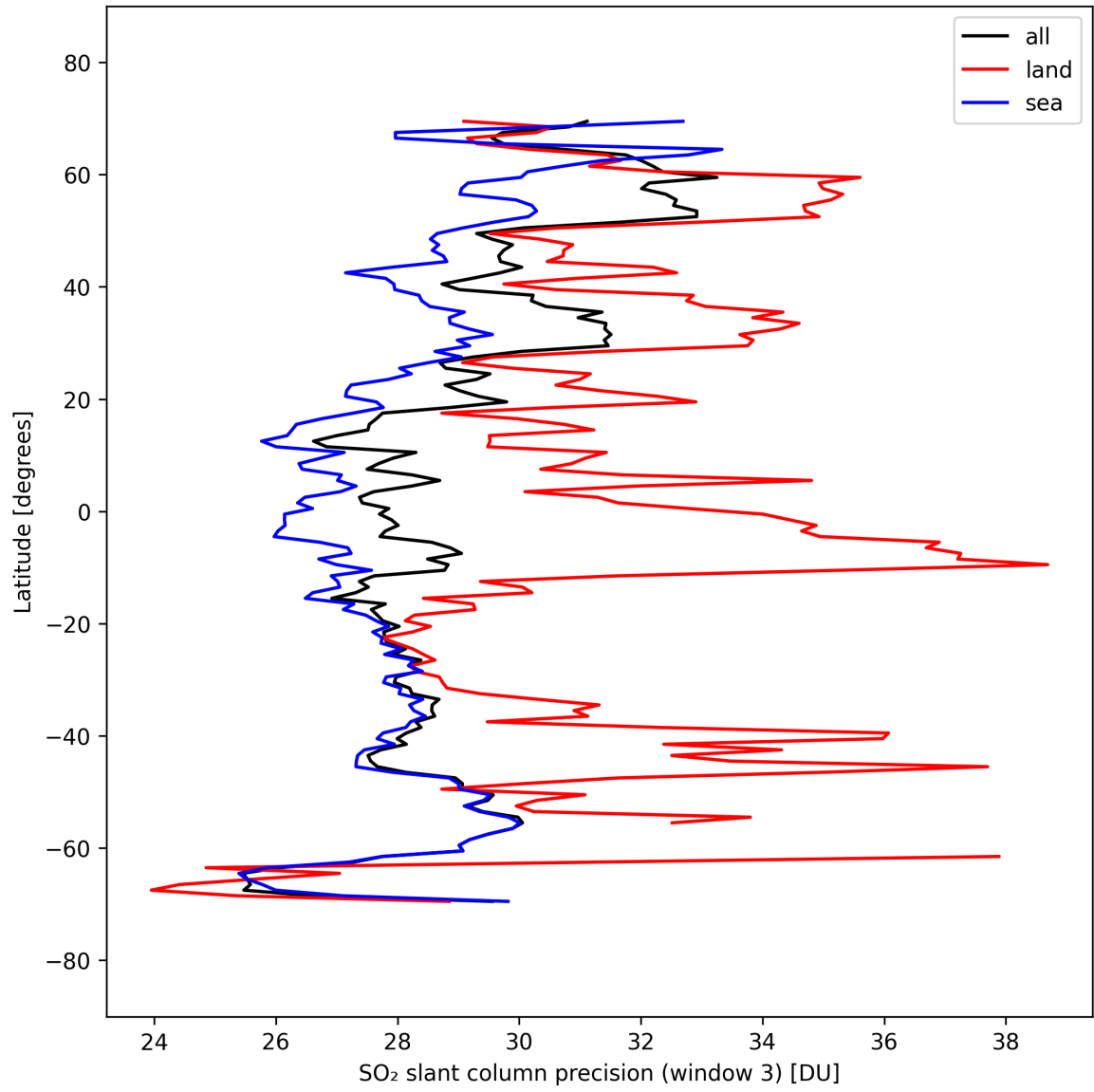


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-09-23 to 2025-09-23.

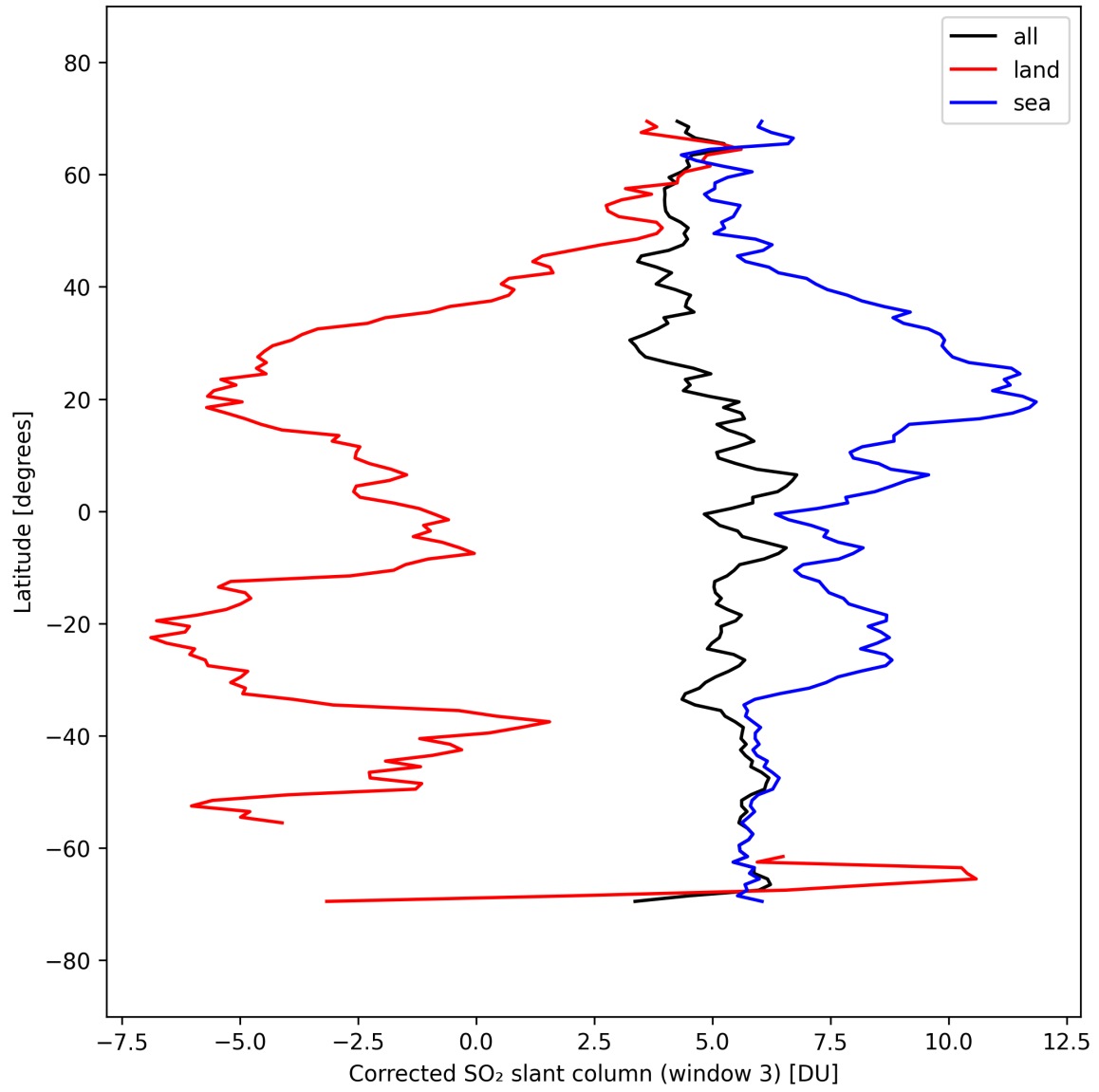


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-09-23 to 2025-09-23.

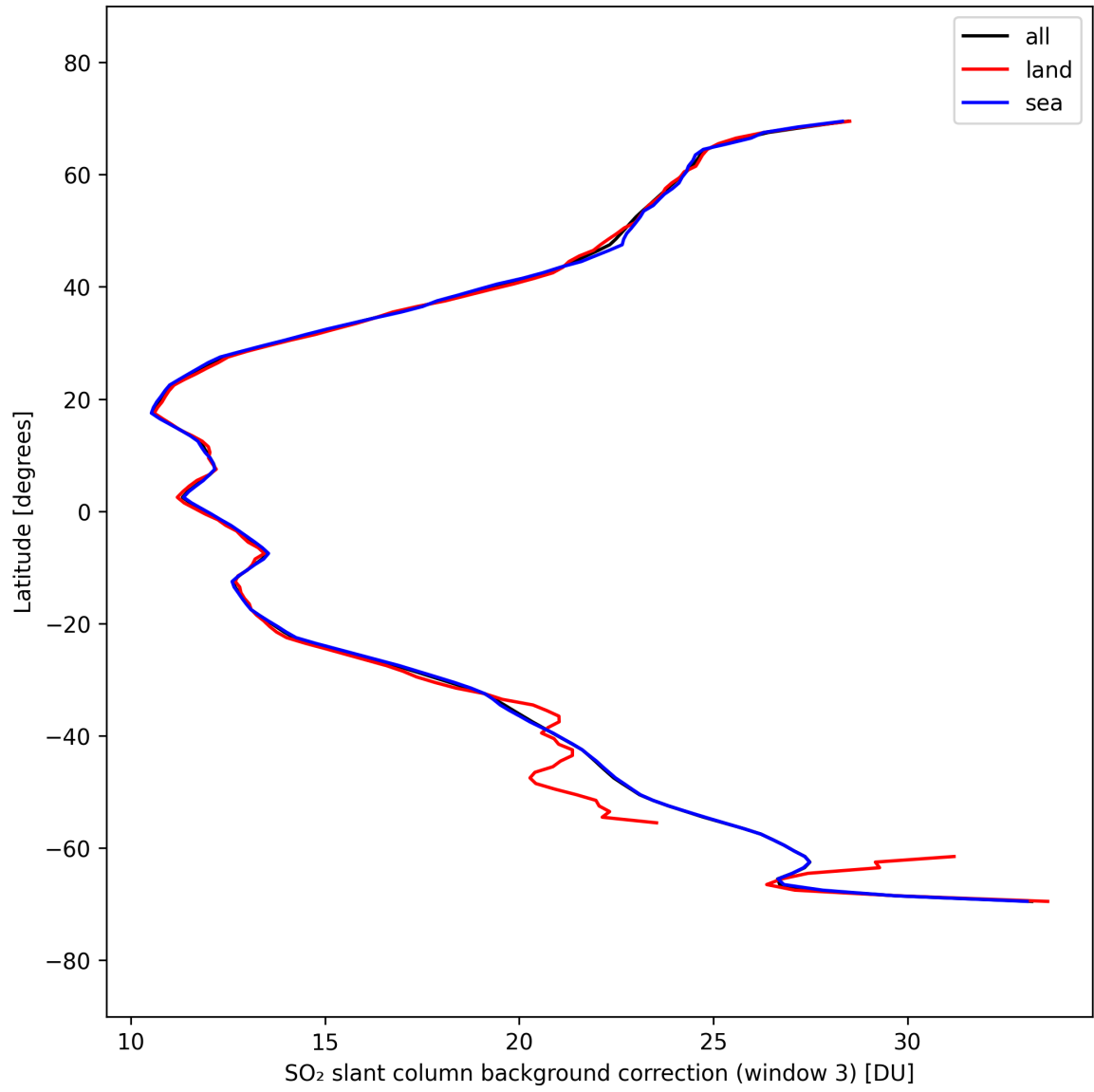


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-09-23 to 2025-09-23.

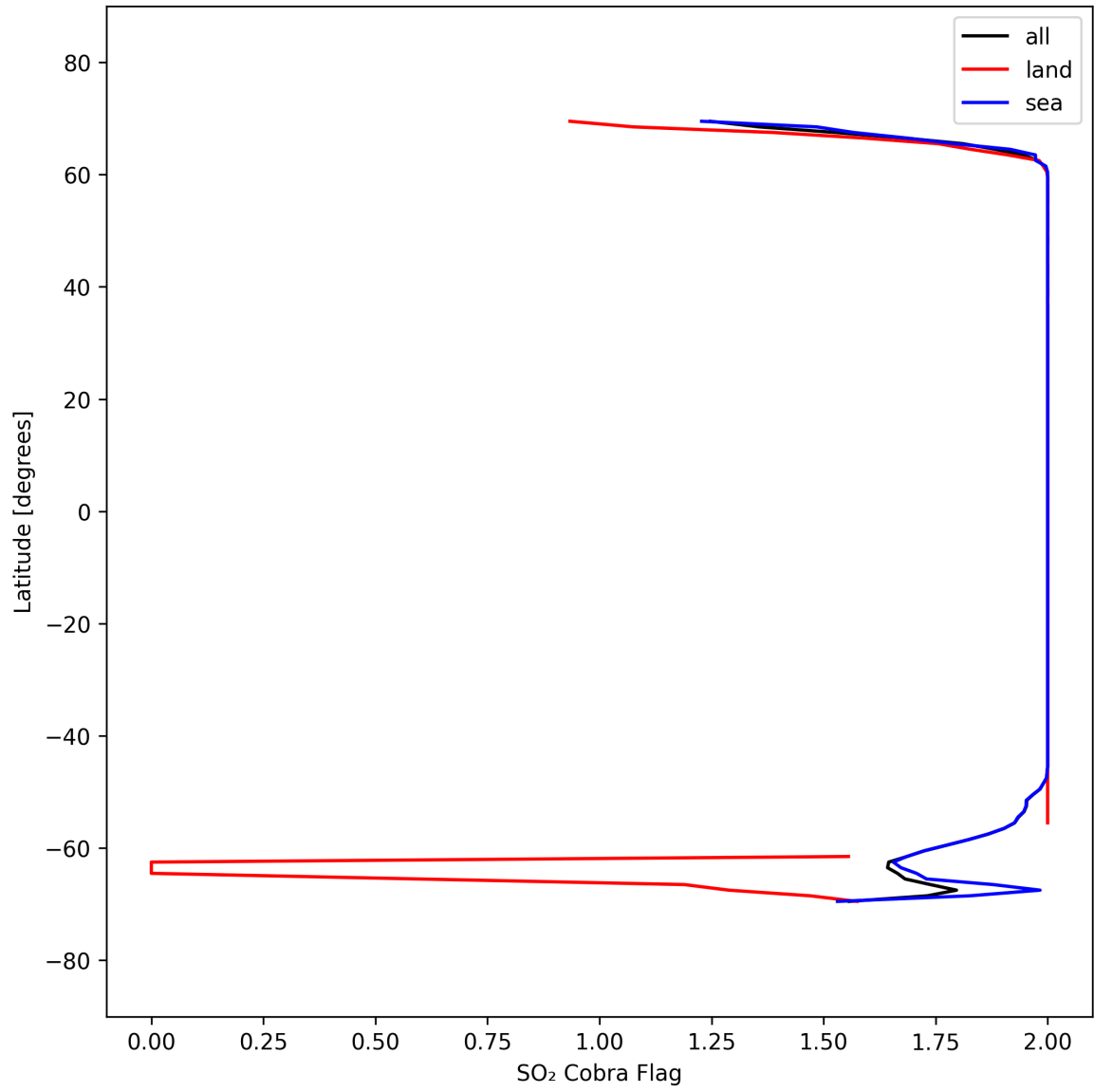


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-09-23 to 2025-09-23.

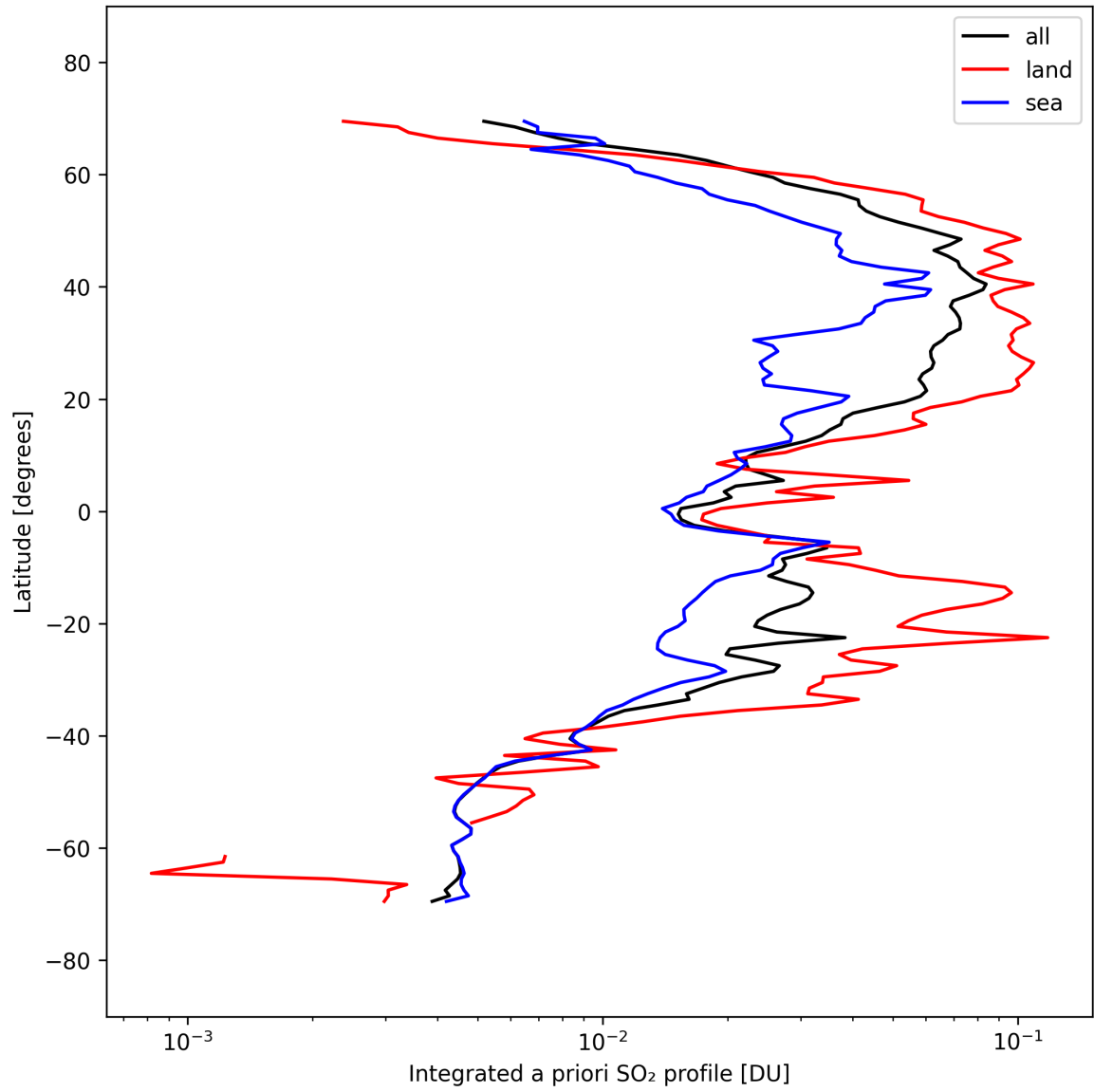


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-09-23 to 2025-09-23.

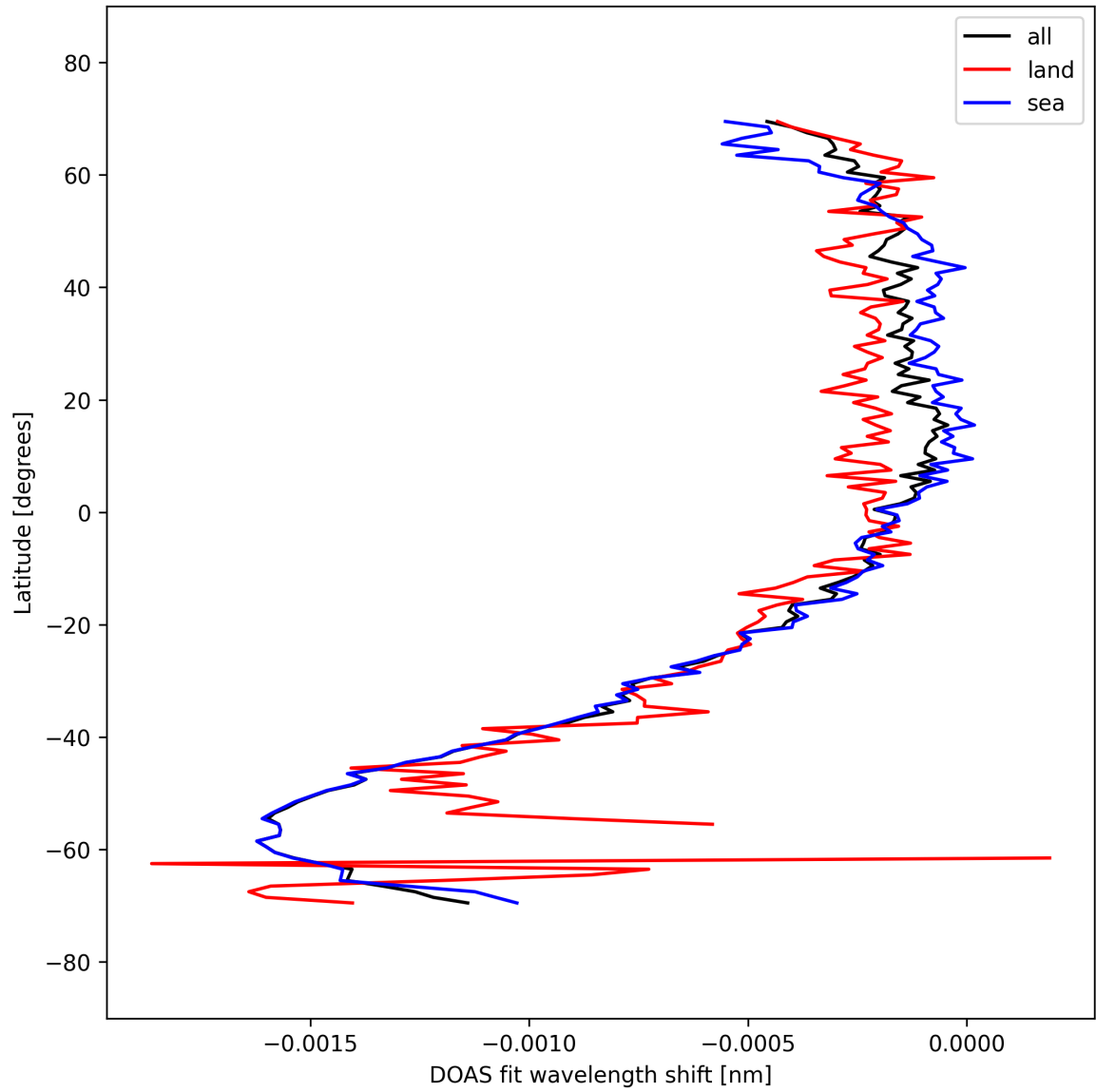


Figure 50: Zonal average of "DOAS fit wavelength shift" for 2025-09-23 to 2025-09-23.

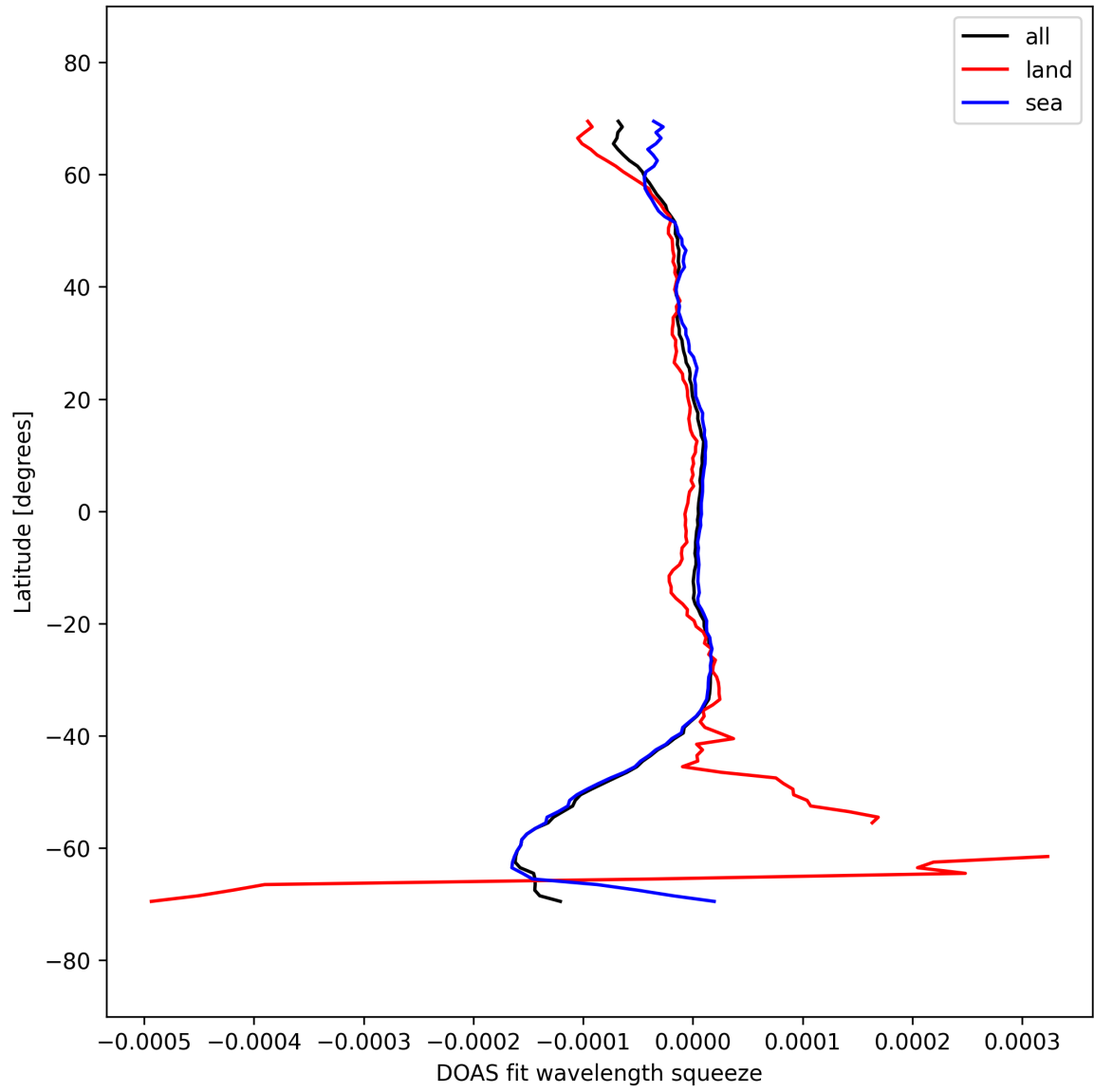


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-09-23 to 2025-09-23.

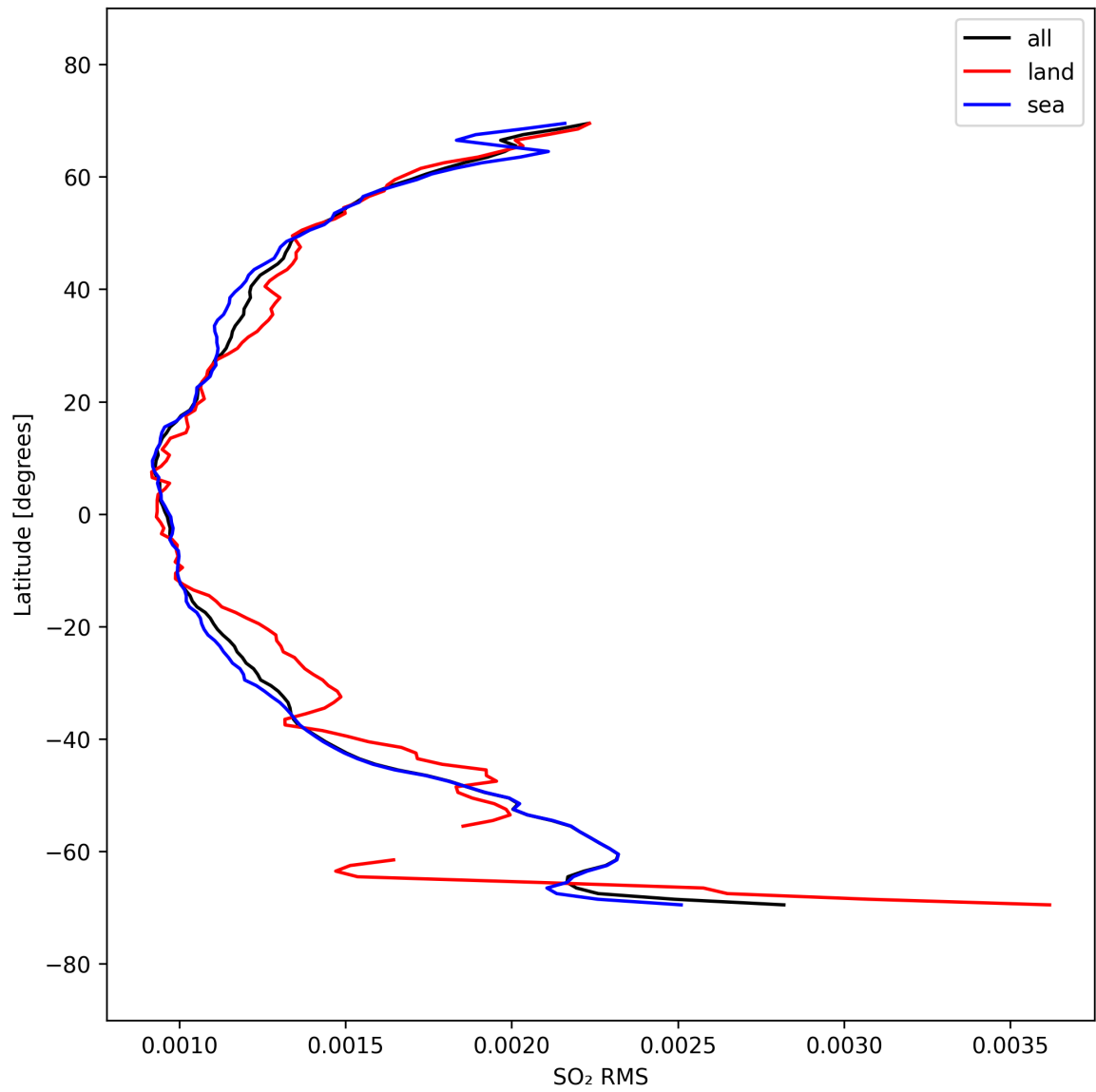


Figure 52: Zonal average of “SO₂ RMS” for 2025-09-23 to 2025-09-23.

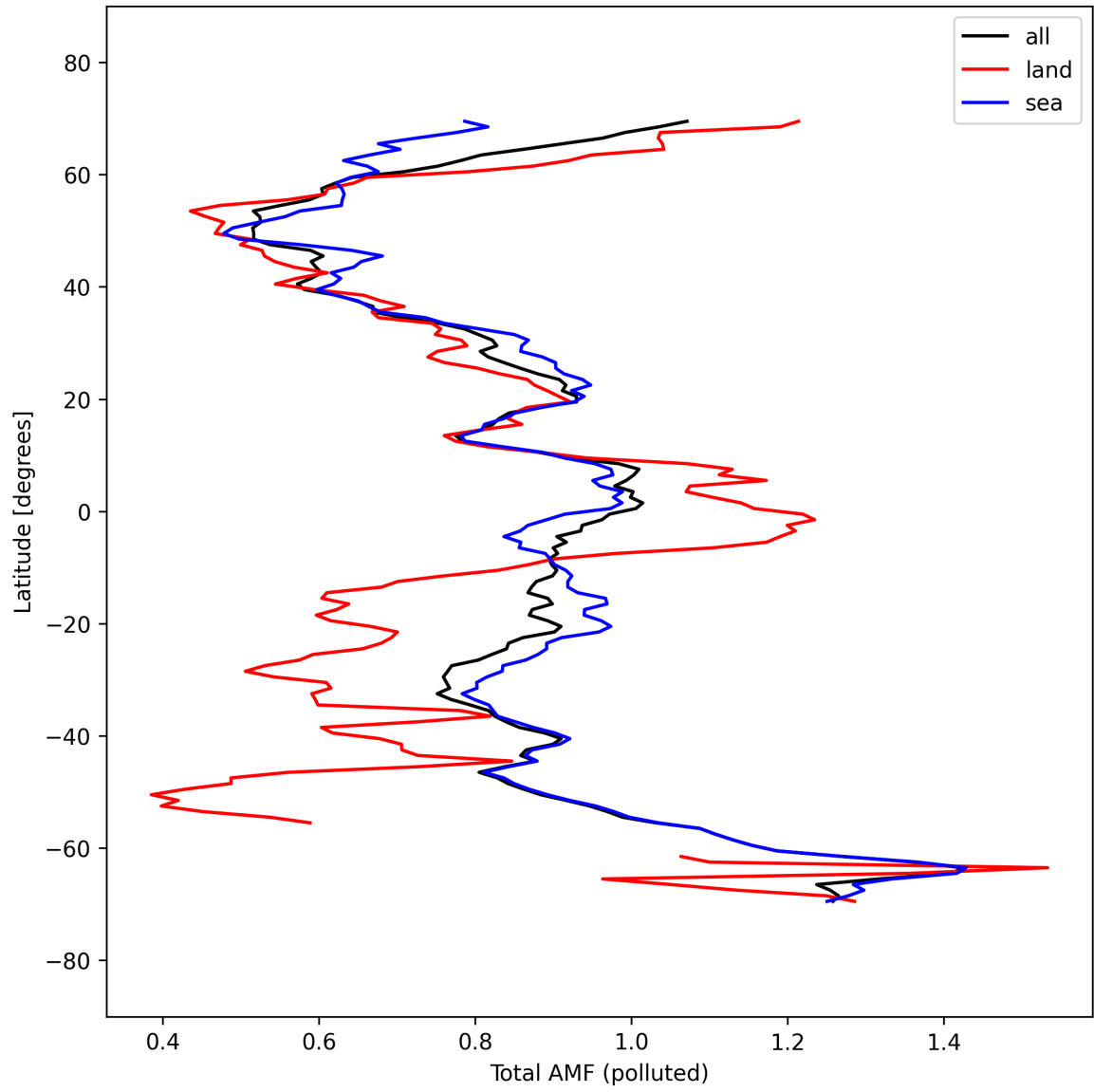


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-09-23 to 2025-09-23.

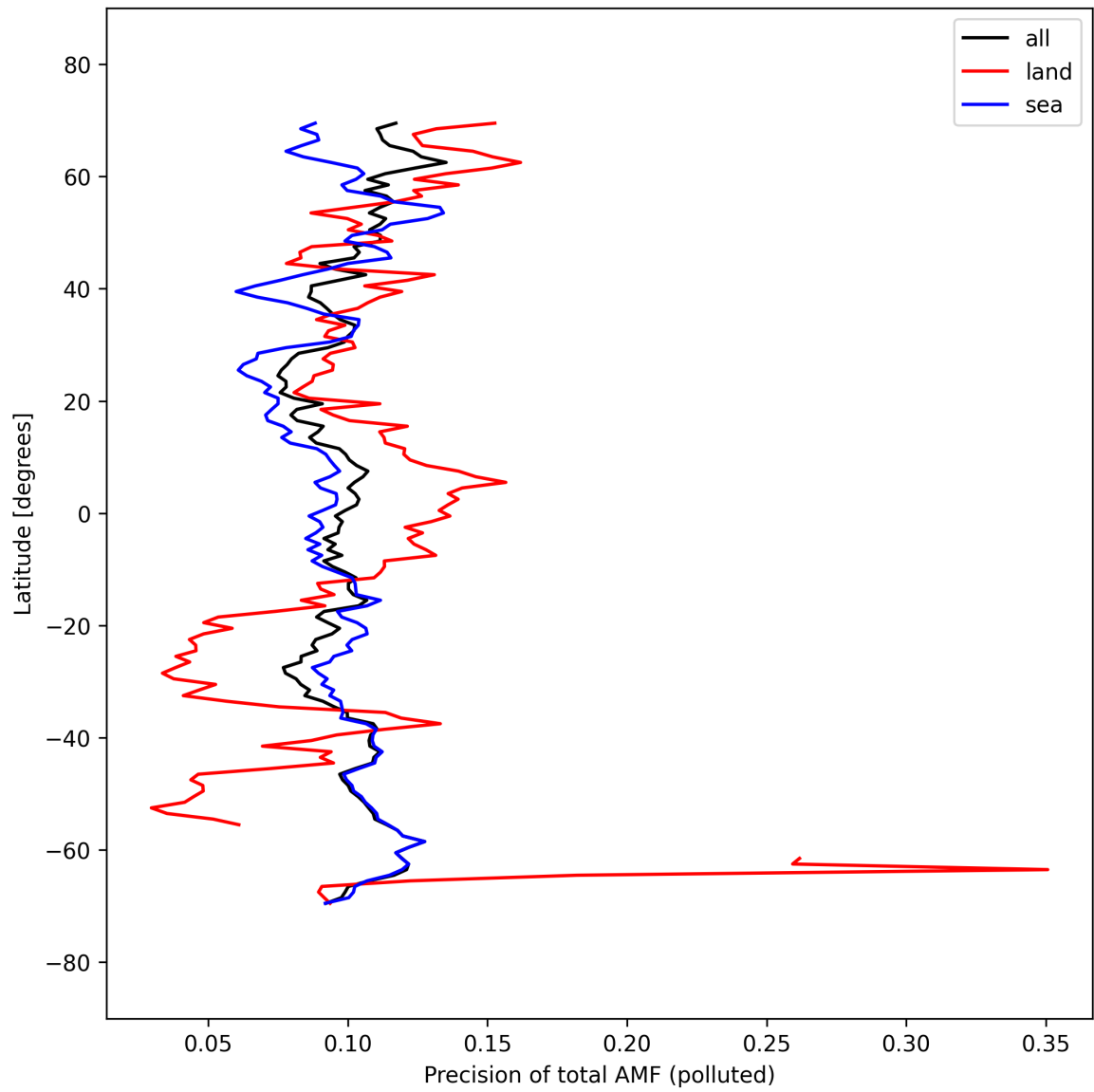


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-09-23 to 2025-09-23.

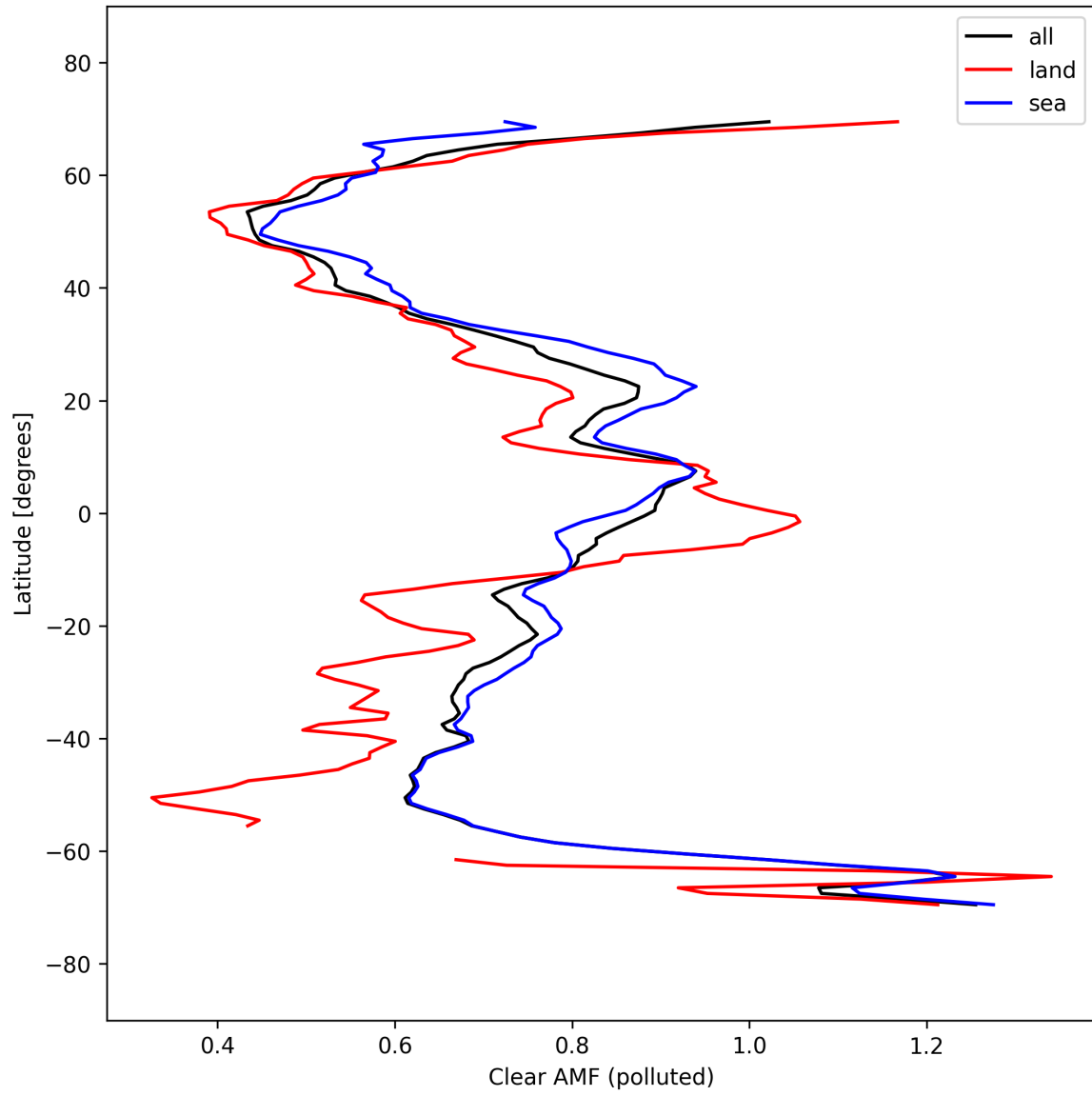


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-09-23 to 2025-09-23.

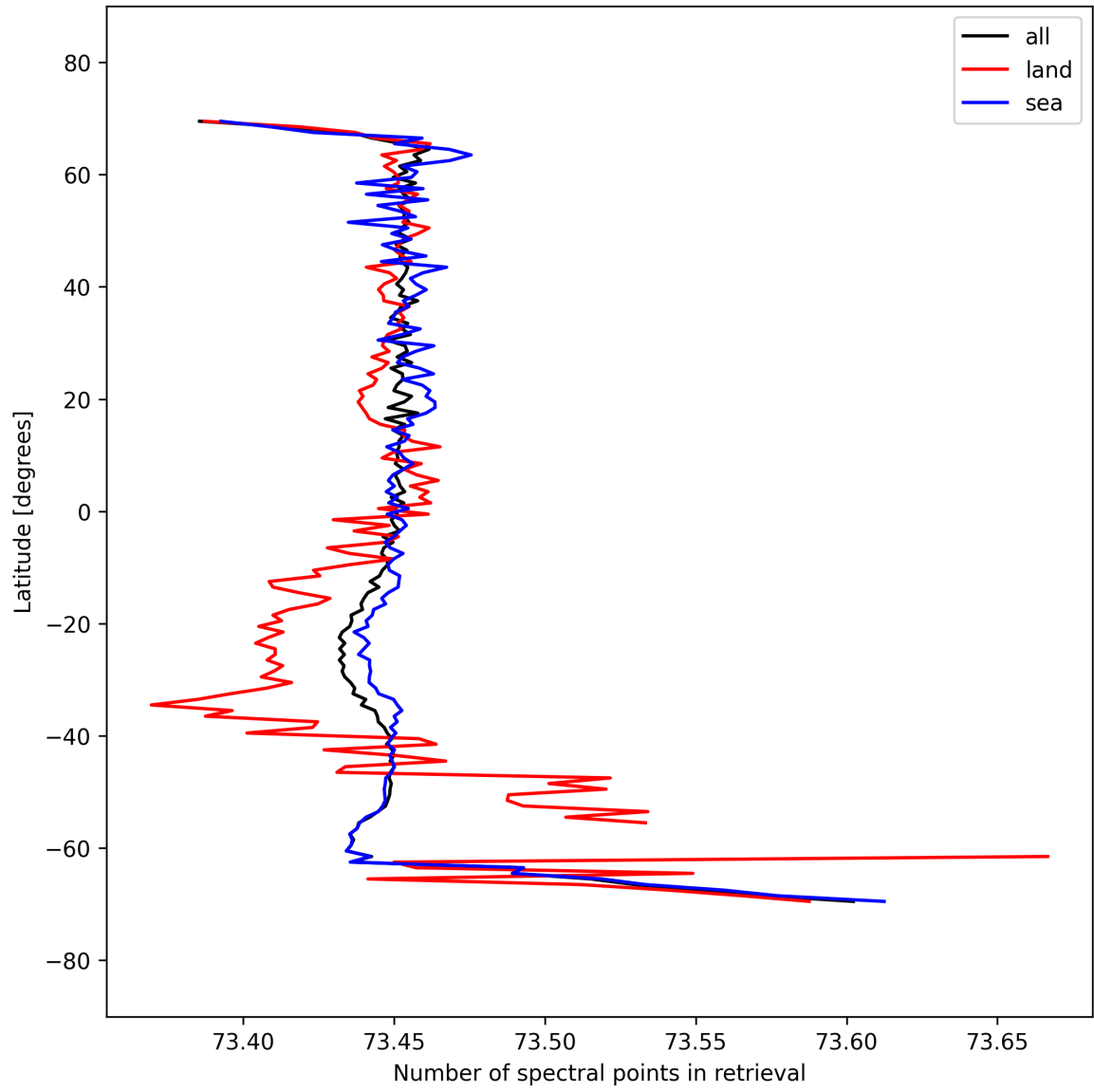


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-09-23 to 2025-09-23.

8 Histograms

The definitions of the parameters given in this section can be found in section 2.

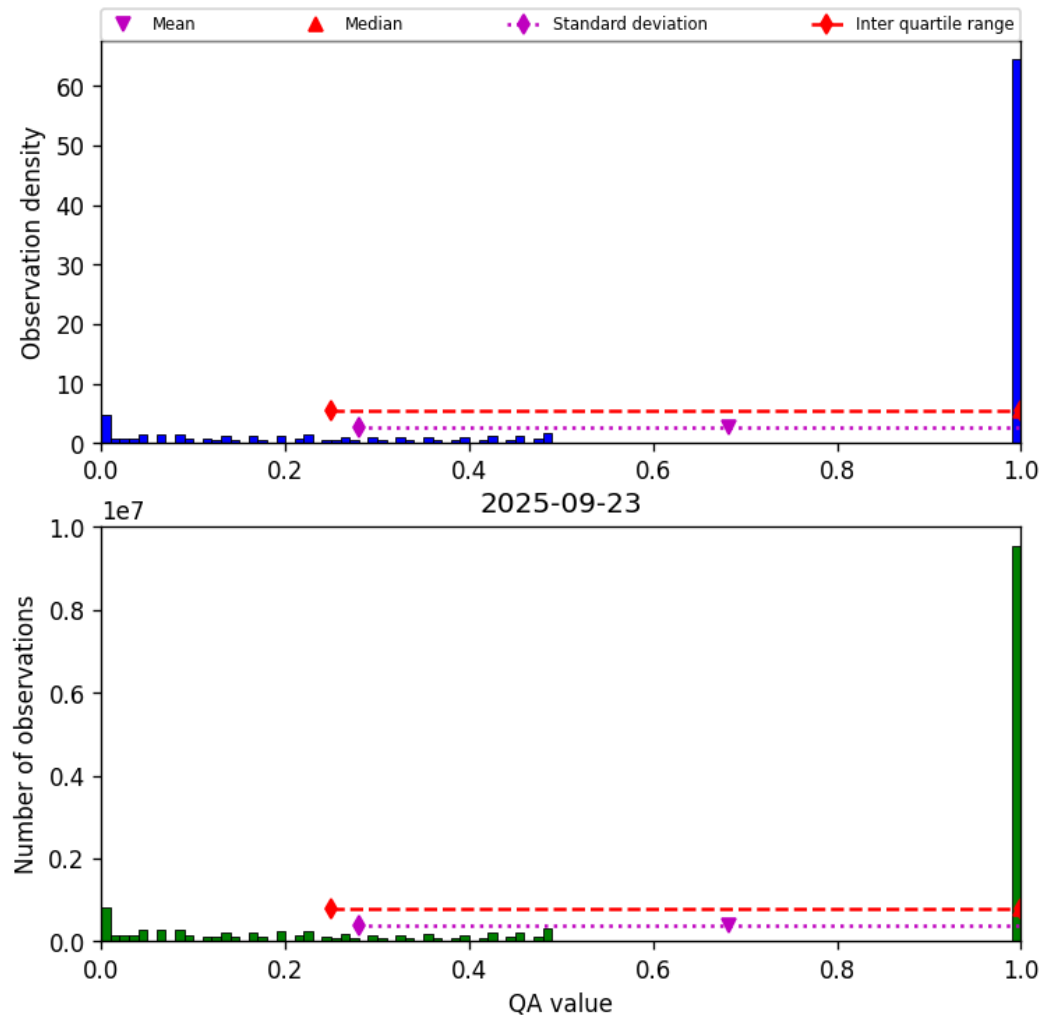


Figure 57: Histogram of “QA value” for 2025-09-23 to 2025-09-23

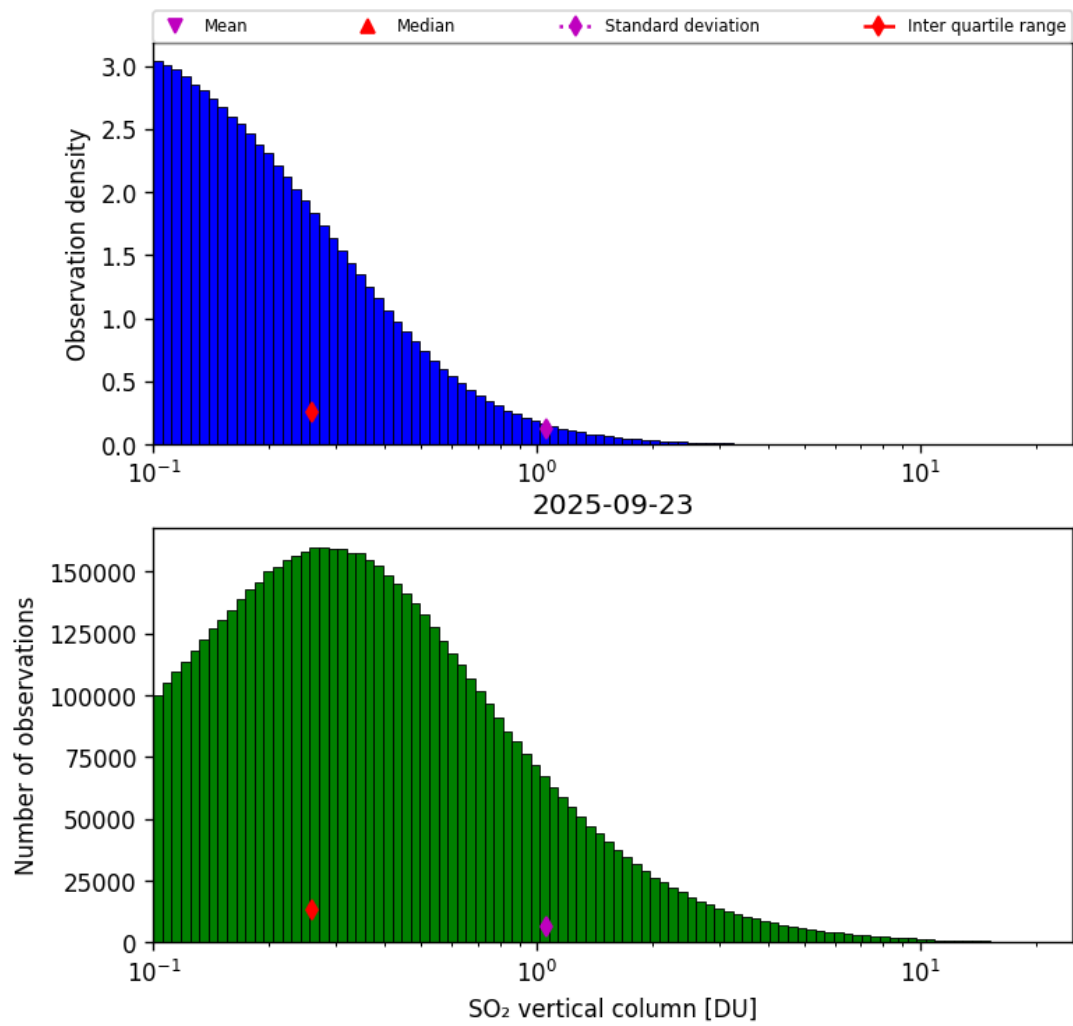


Figure 58: Histogram of “SO₂ vertical column” for 2025-09-23 to 2025-09-23

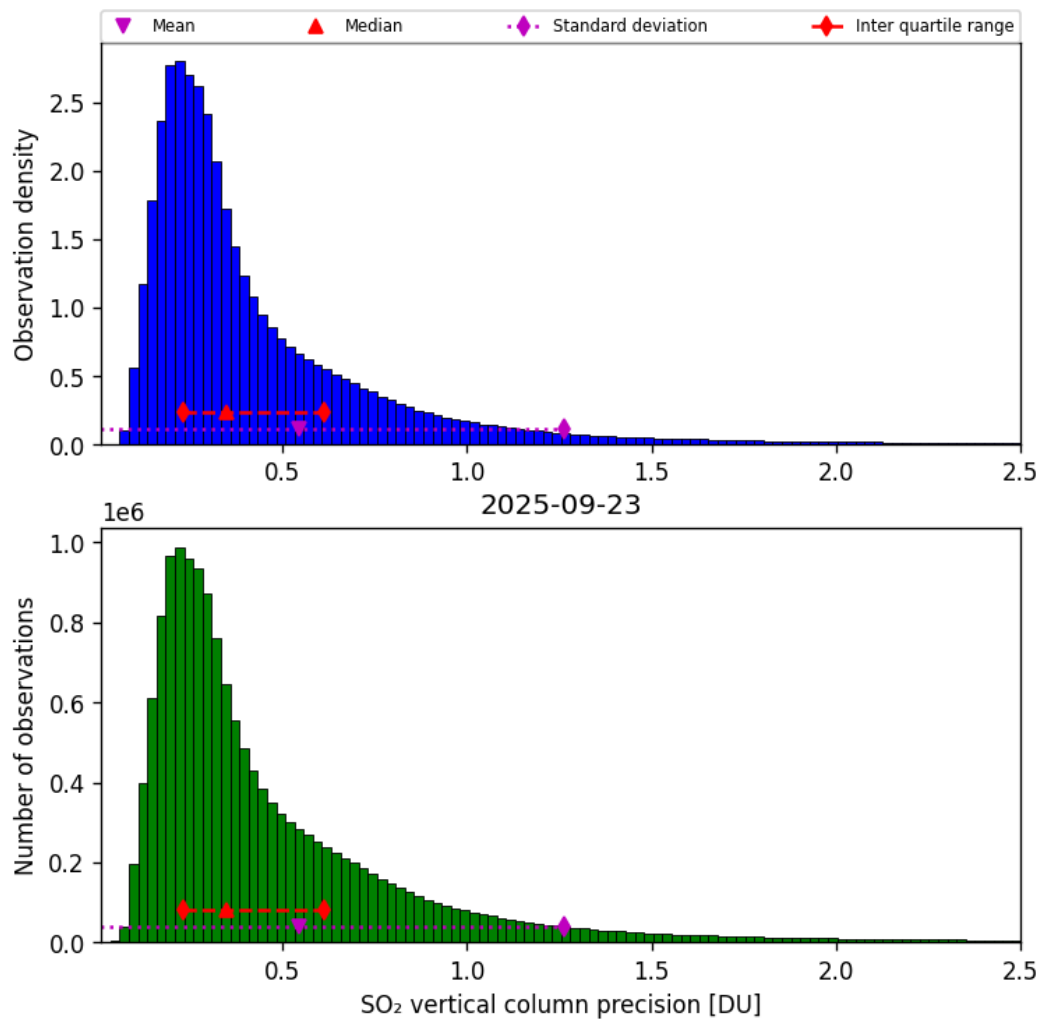


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-09-23 to 2025-09-23

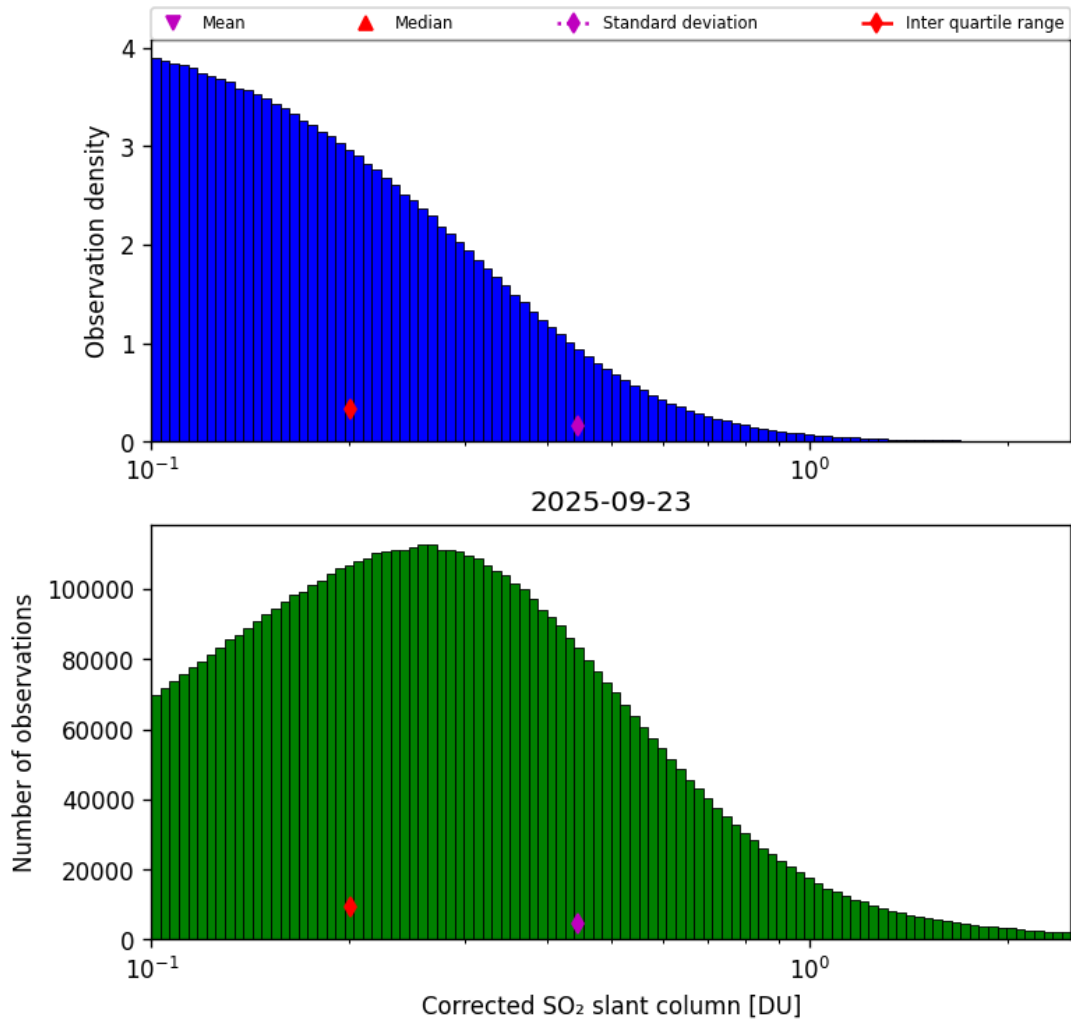


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-09-23 to 2025-09-23

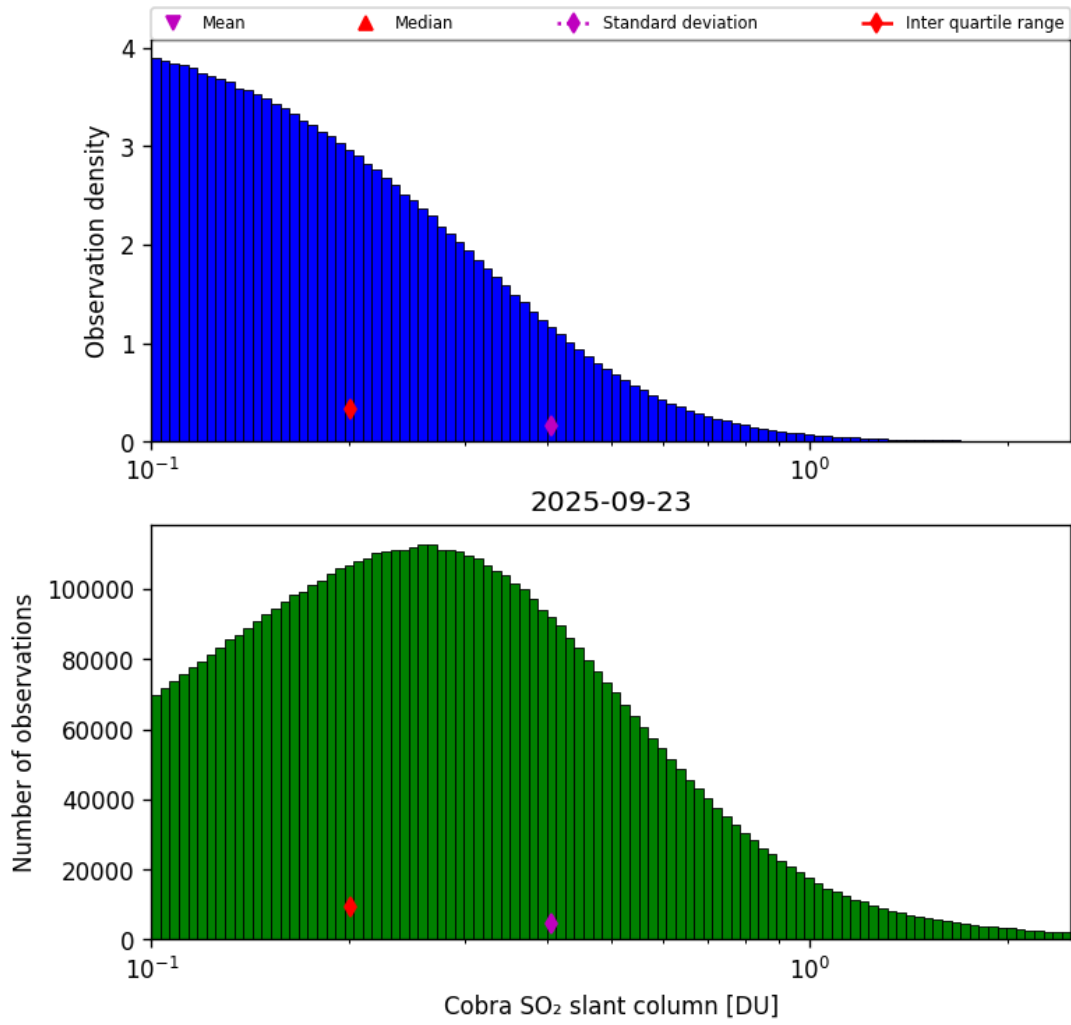


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-09-23 to 2025-09-23

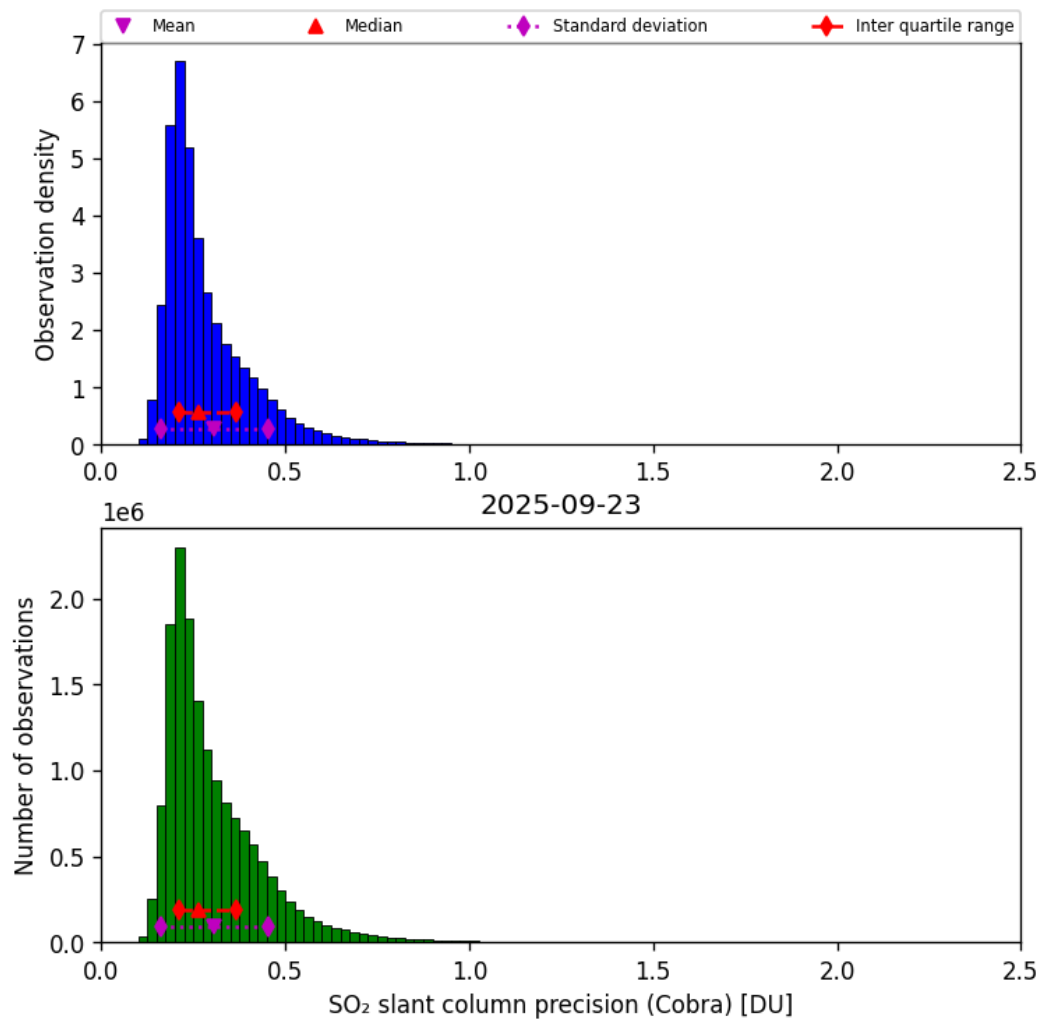


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-09-23 to 2025-09-23

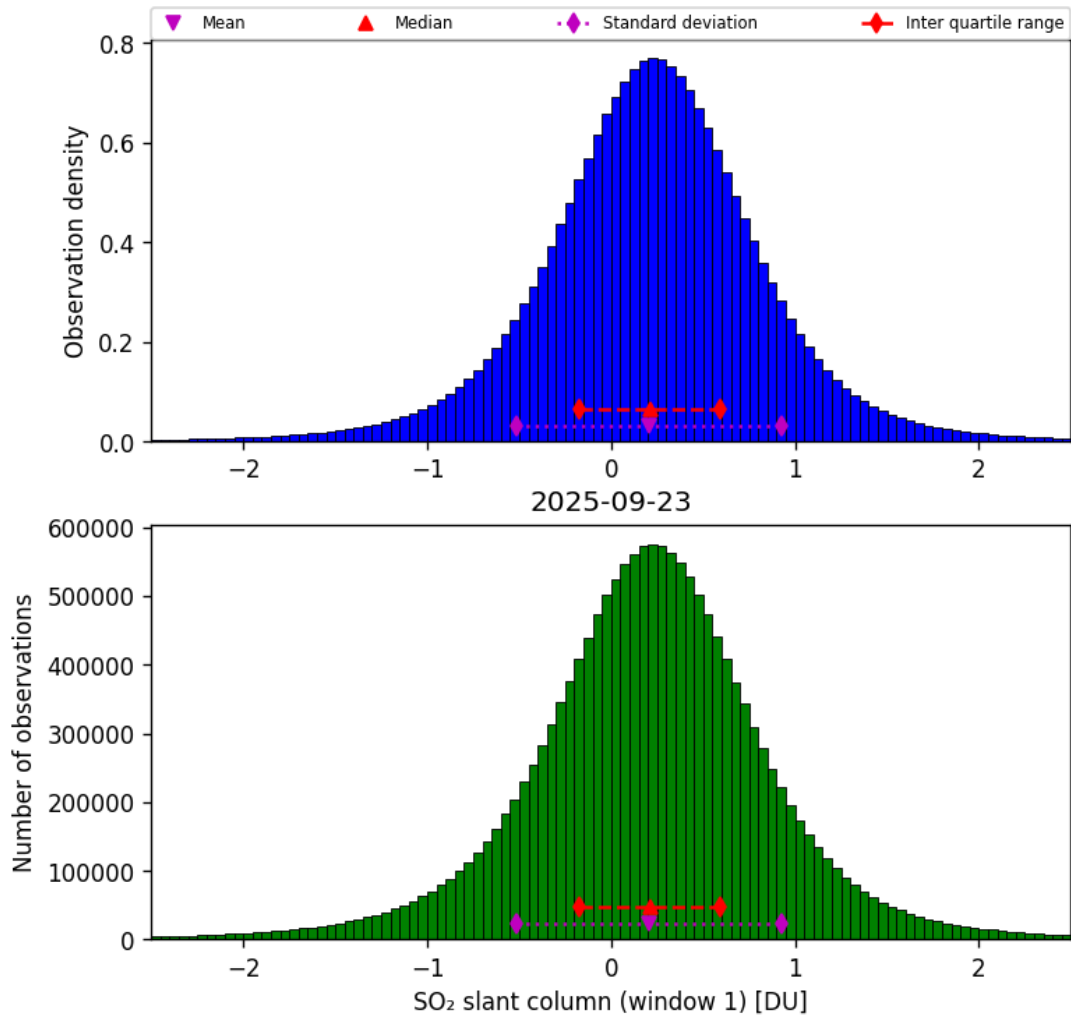


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-09-23 to 2025-09-23

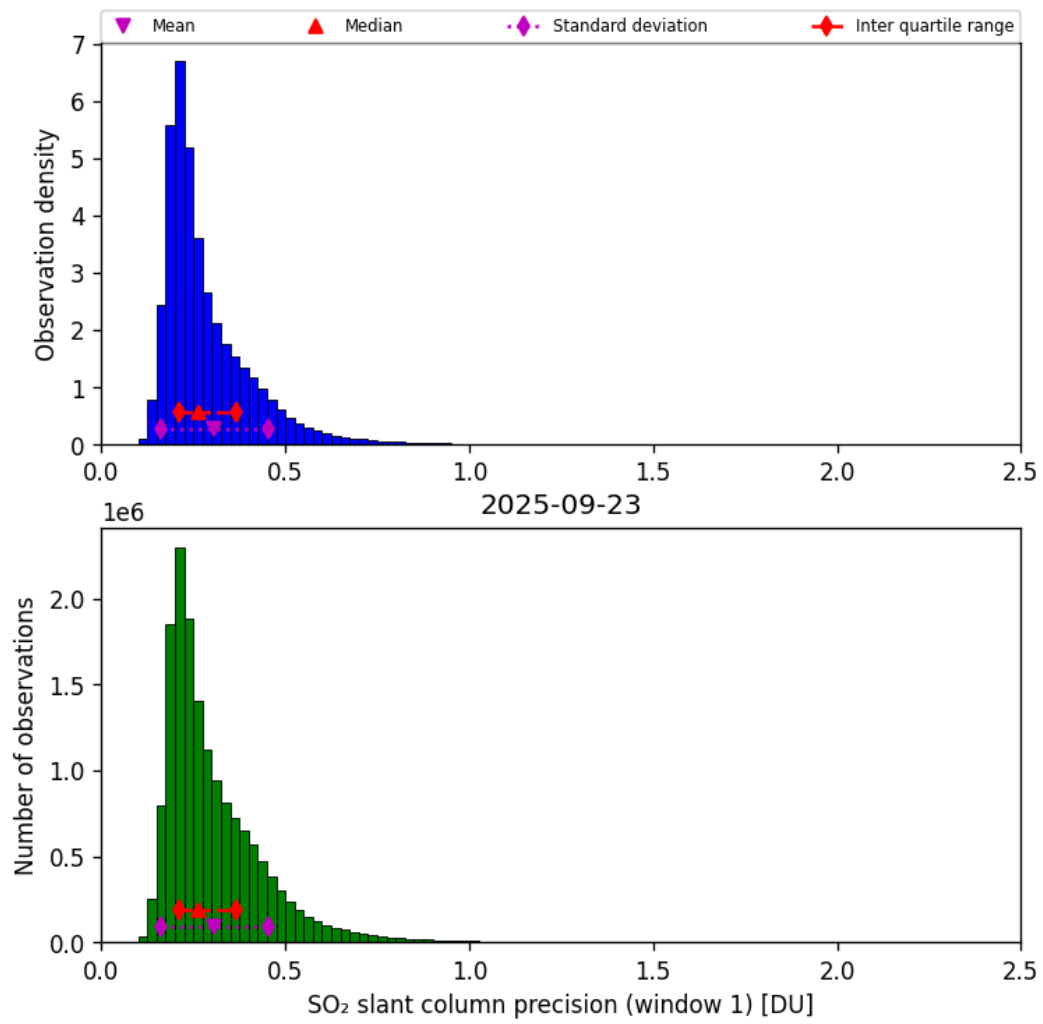


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-09-23 to 2025-09-23

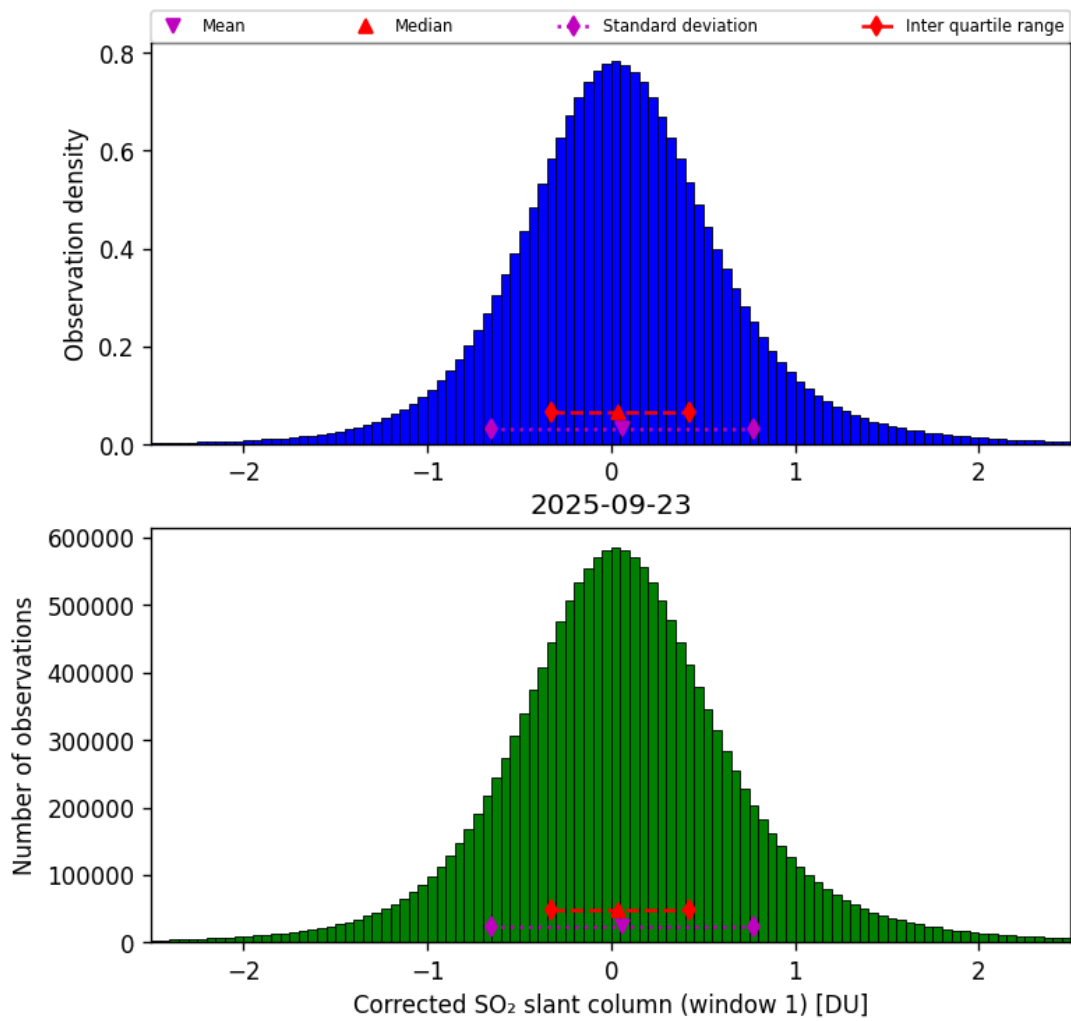


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-09-23 to 2025-09-23

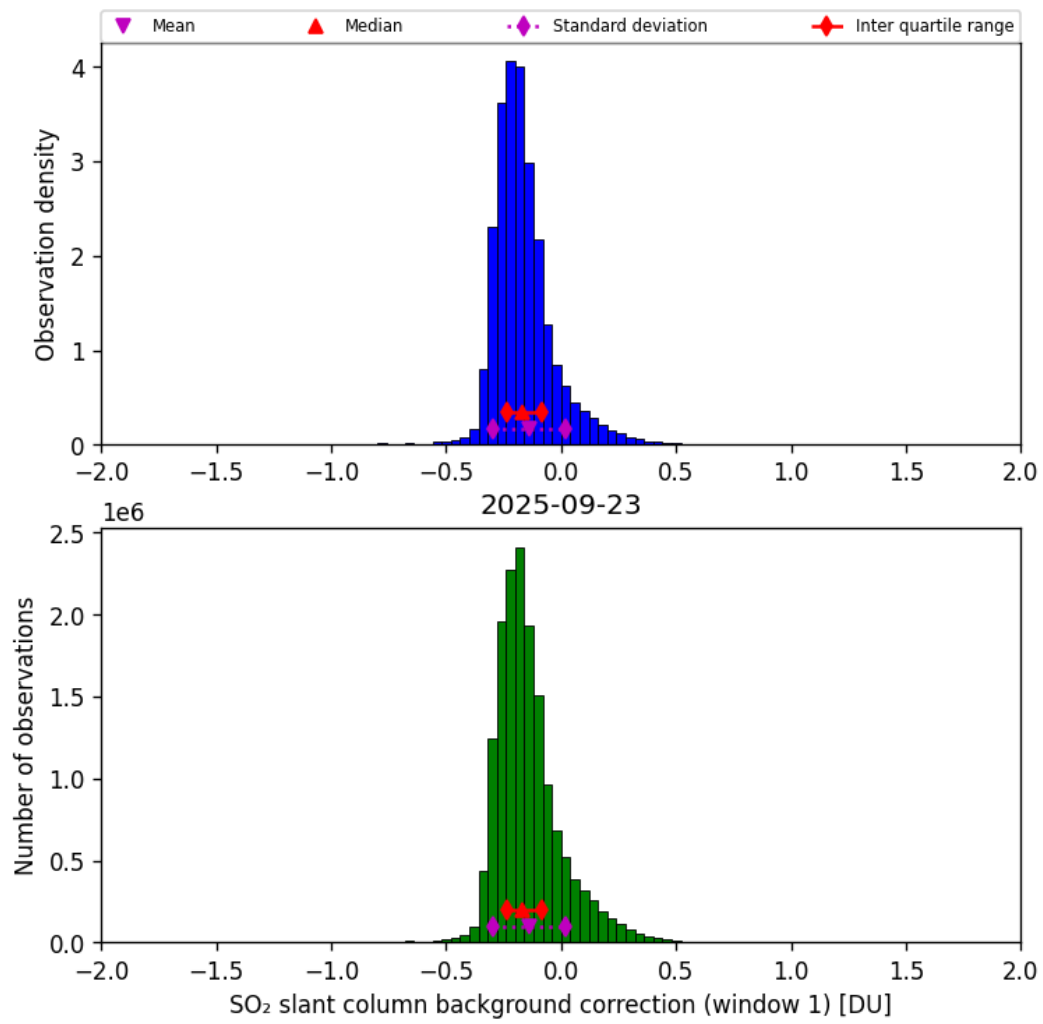


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-09-23 to 2025-09-23

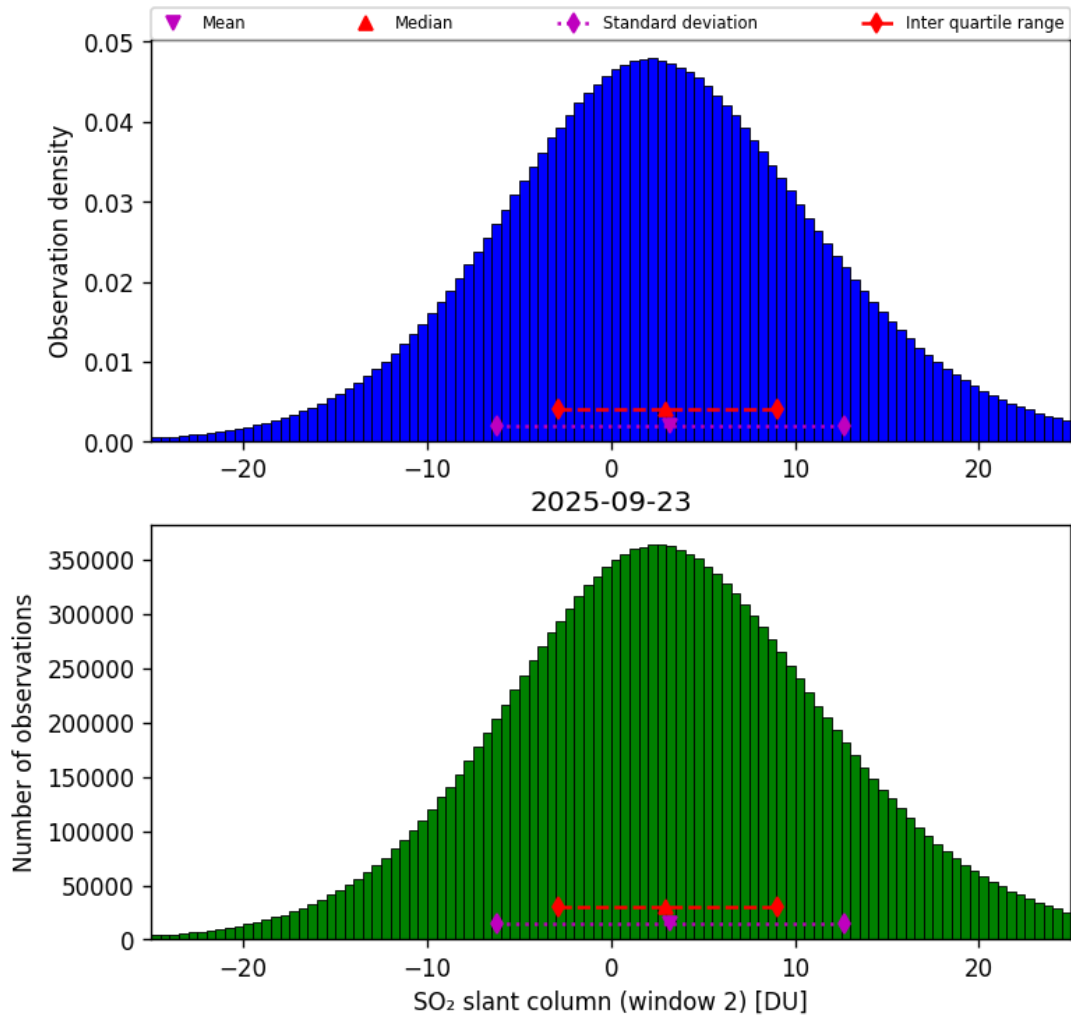


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-09-23 to 2025-09-23

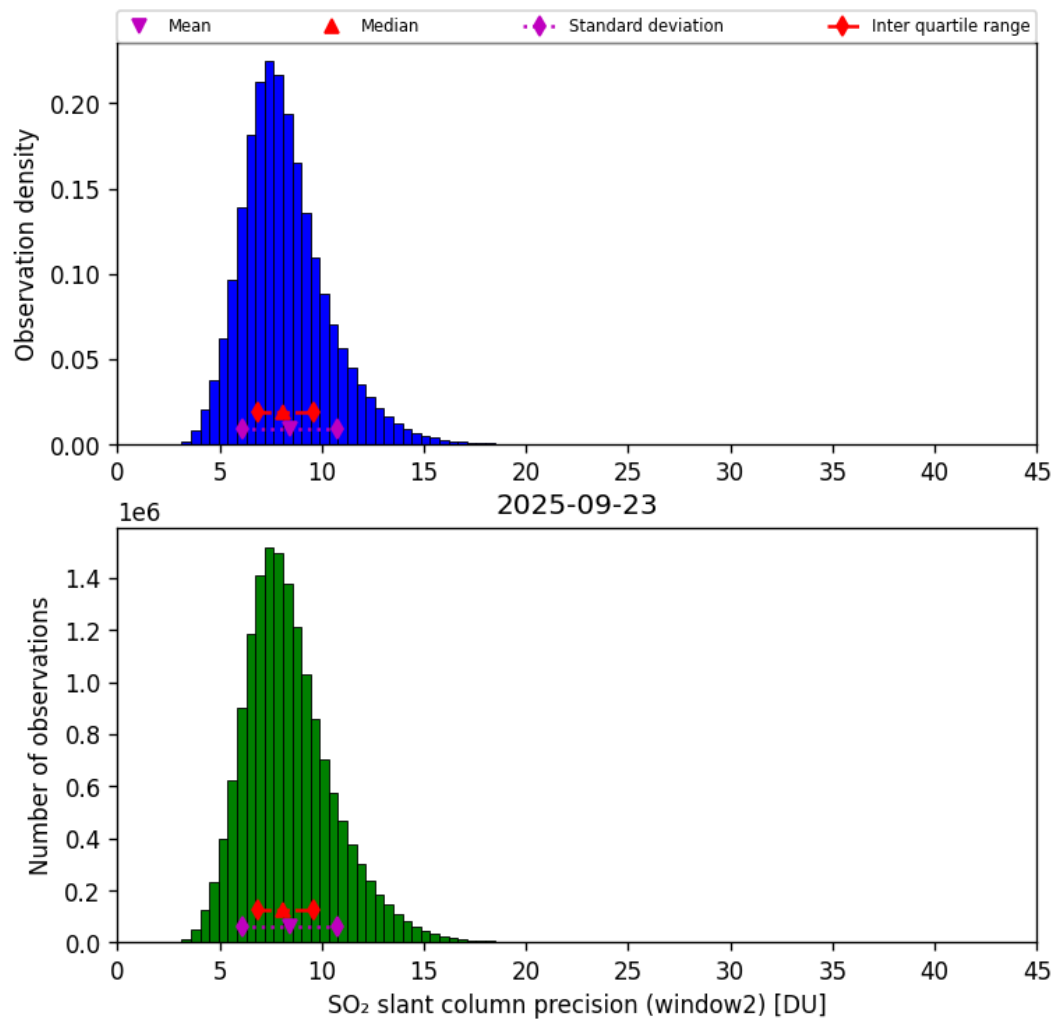


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-09-23 to 2025-09-23

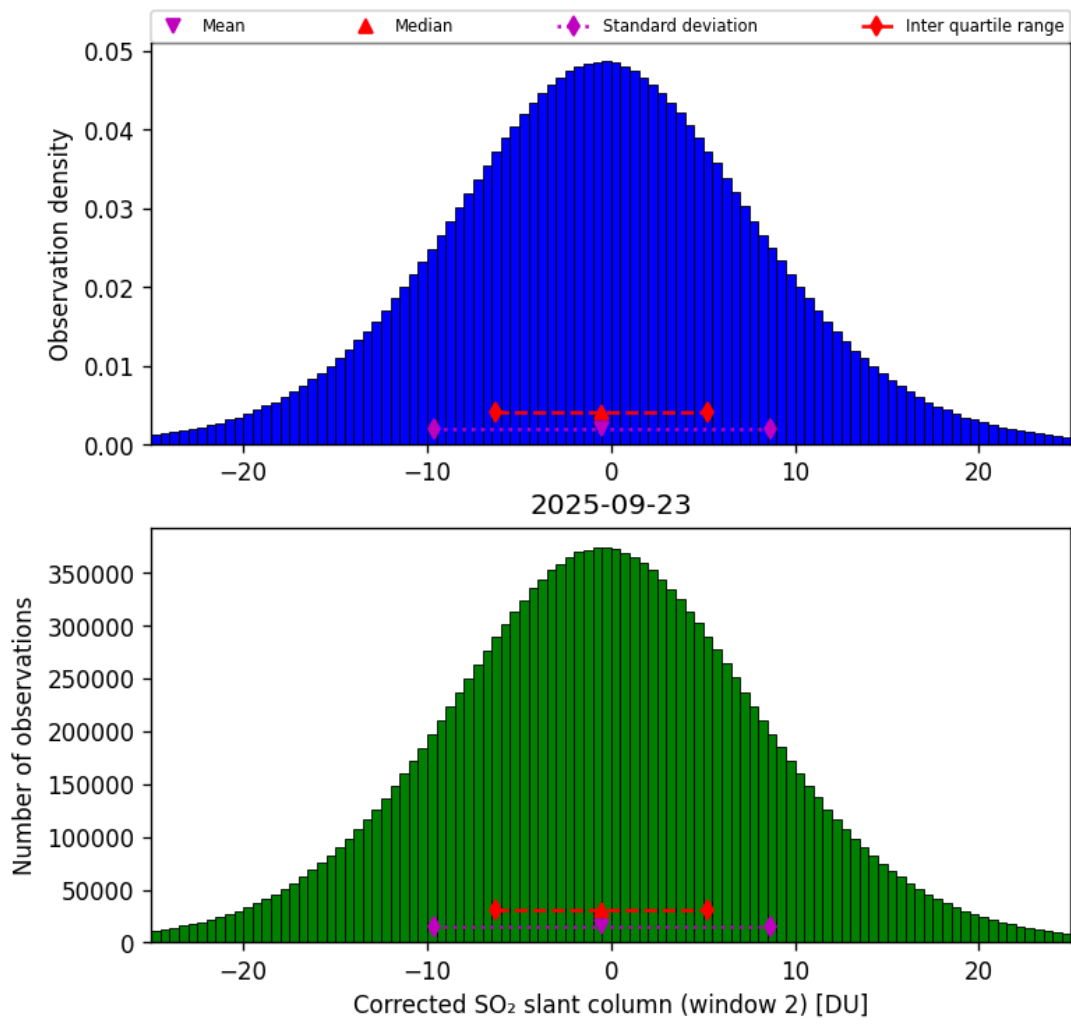


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-09-23 to 2025-09-23

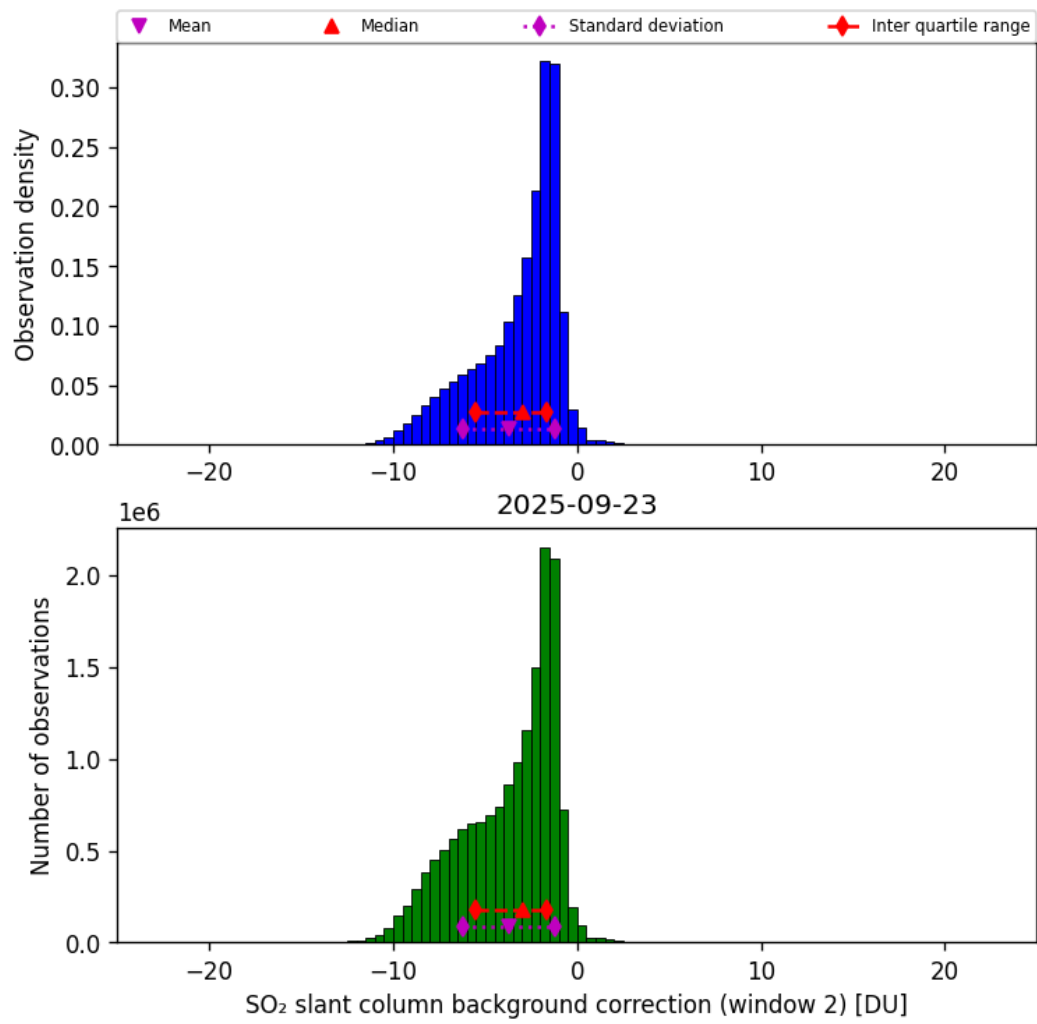


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-09-23 to 2025-09-23

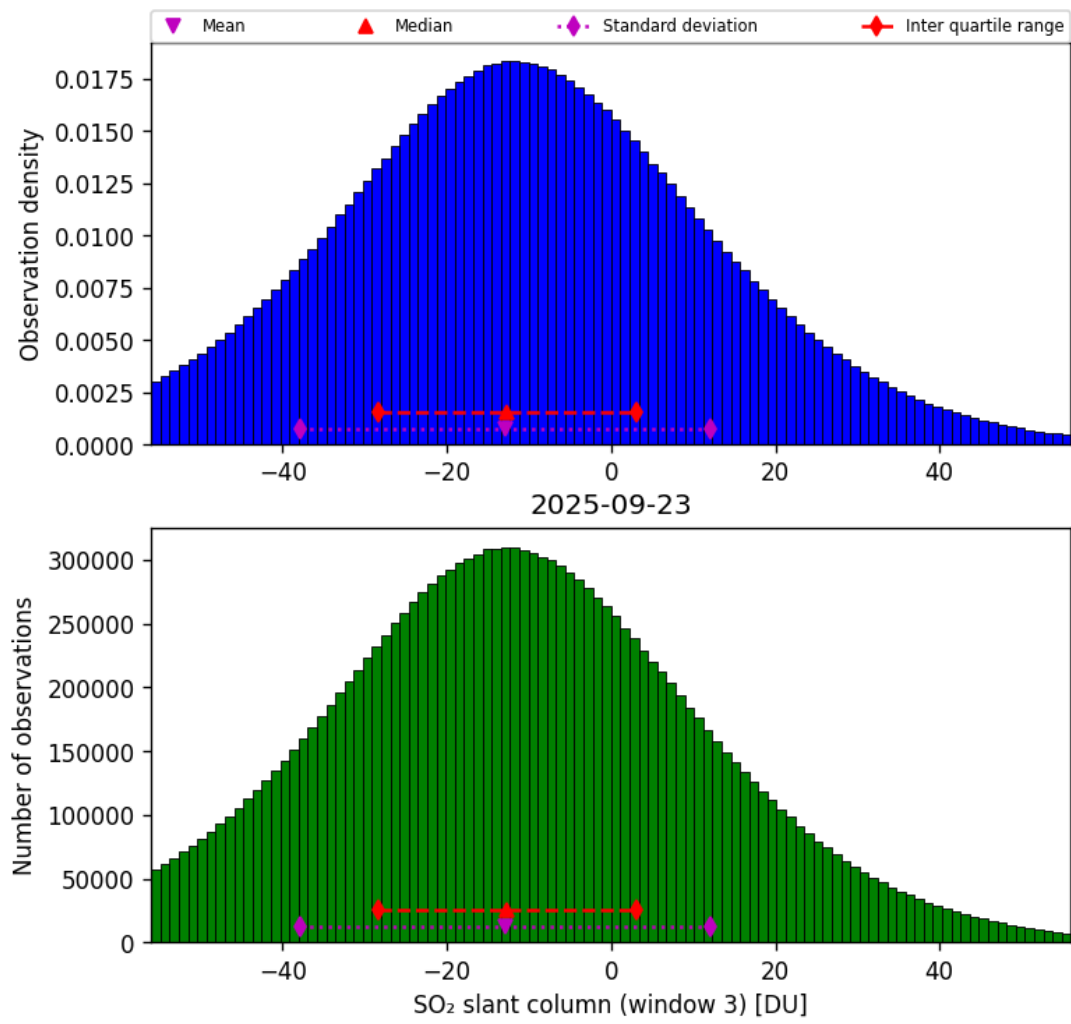


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-09-23 to 2025-09-23

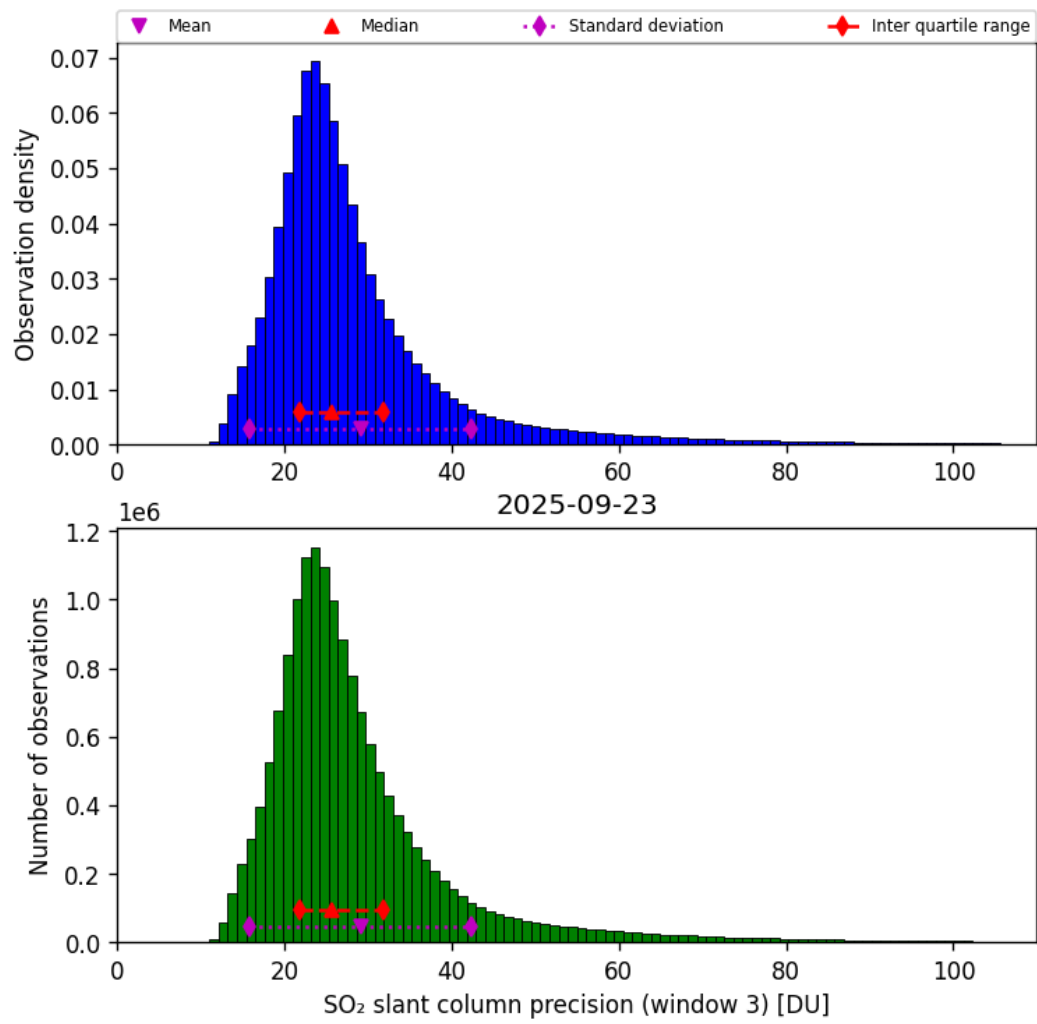


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-09-23 to 2025-09-23

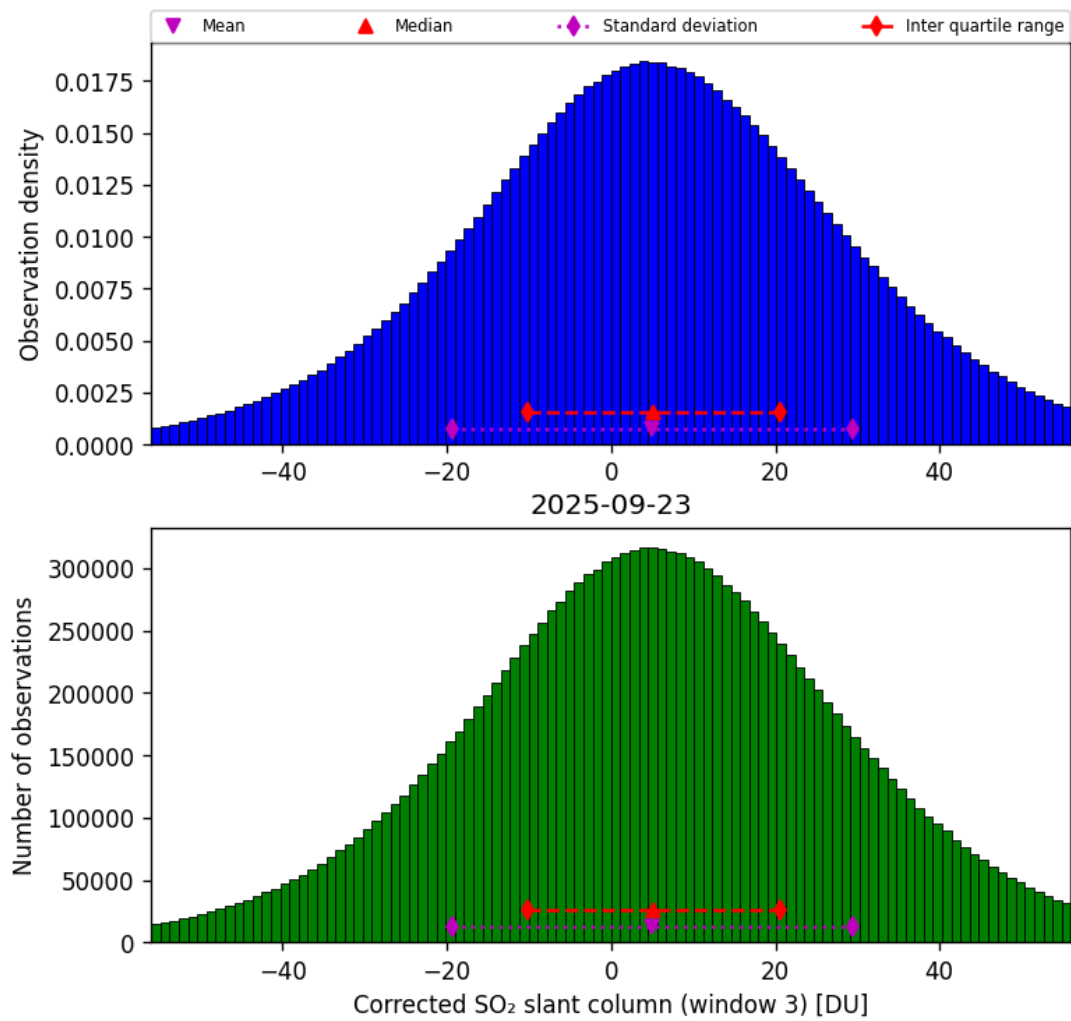


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-09-23 to 2025-09-23

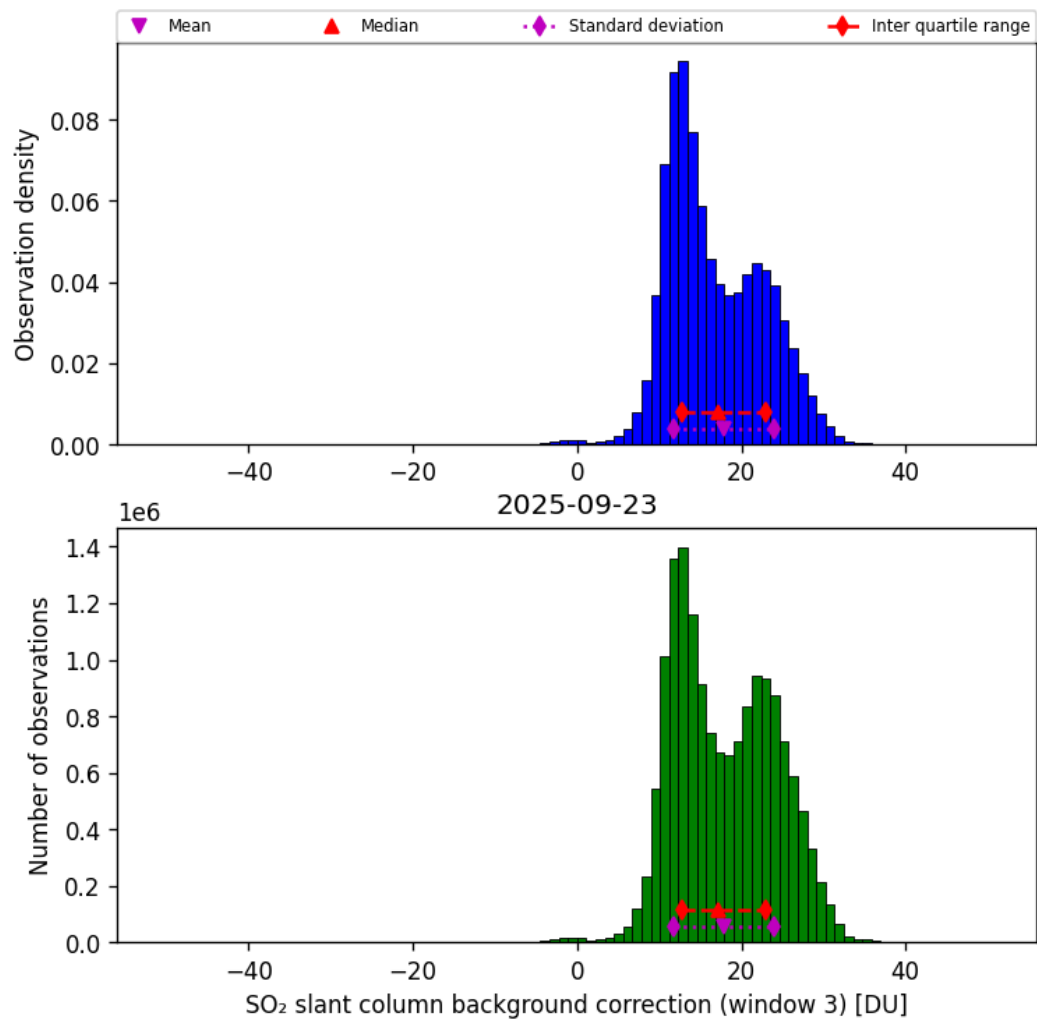


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-09-23 to 2025-09-23

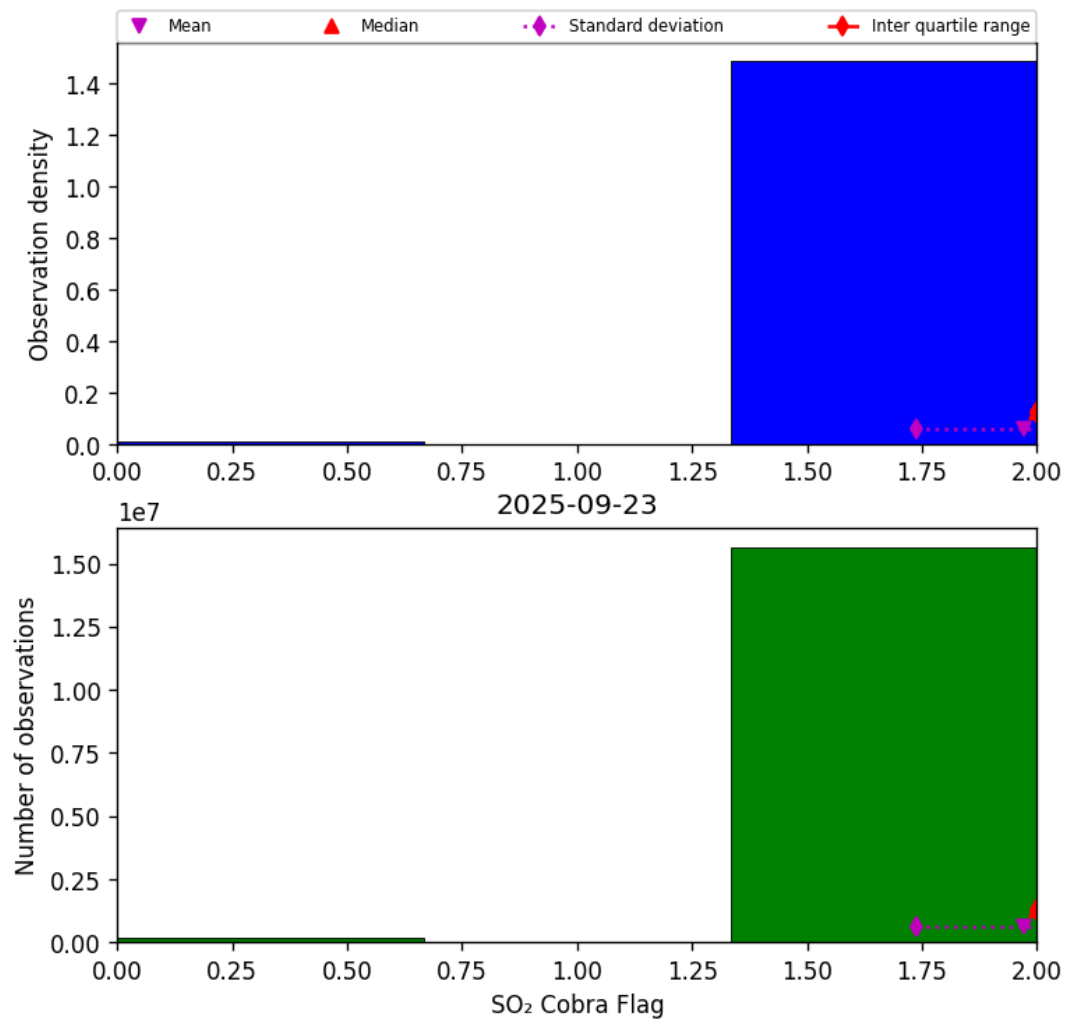


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-09-23 to 2025-09-23

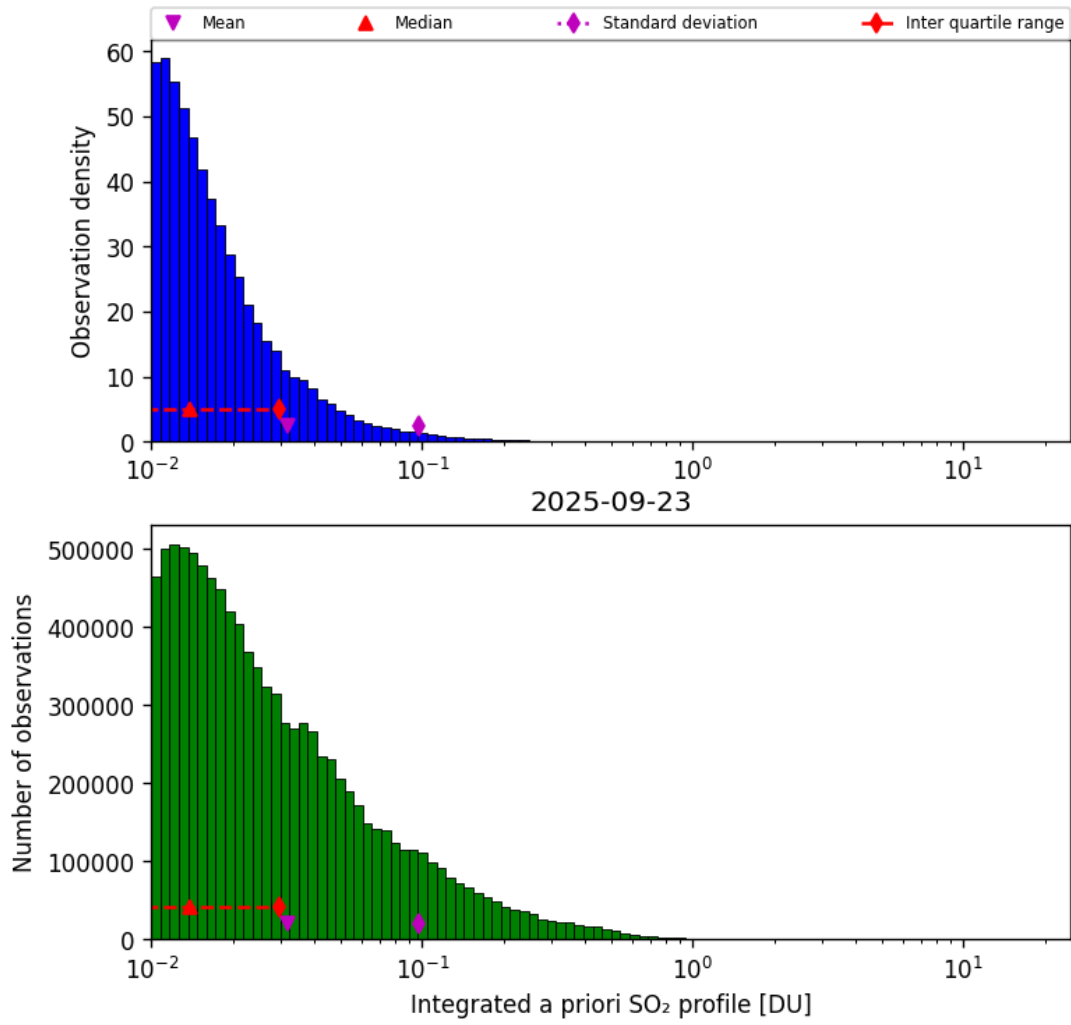


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-09-23 to 2025-09-23

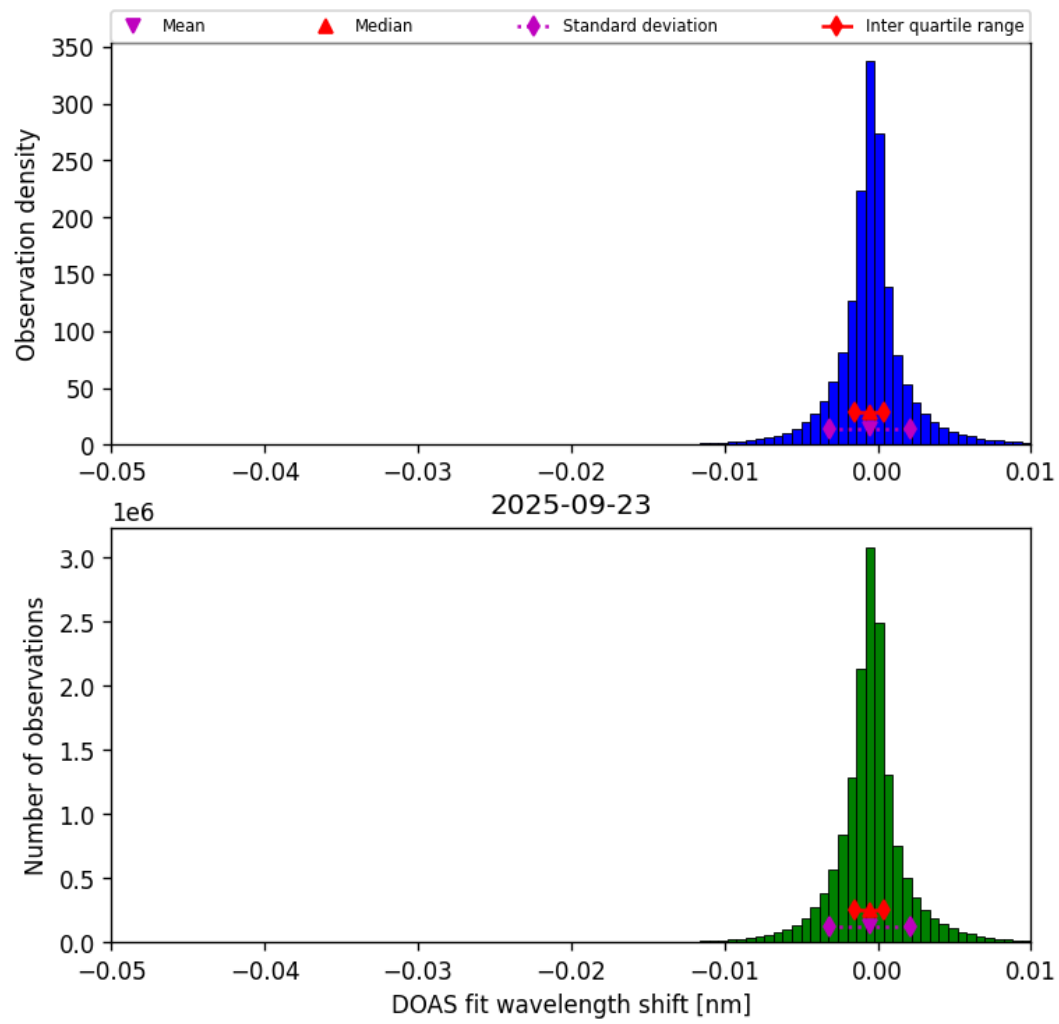


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-09-23 to 2025-09-23

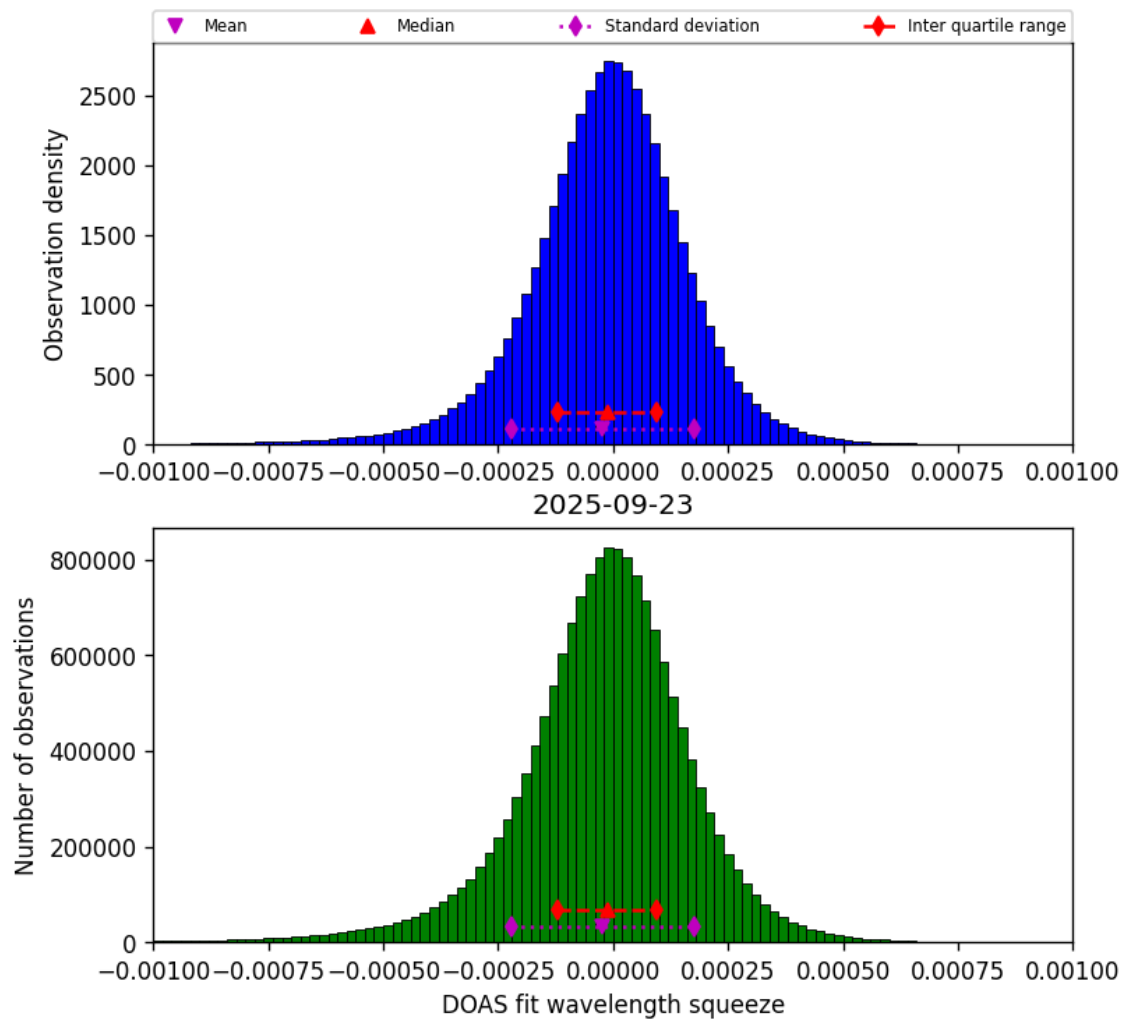


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-09-23 to 2025-09-23

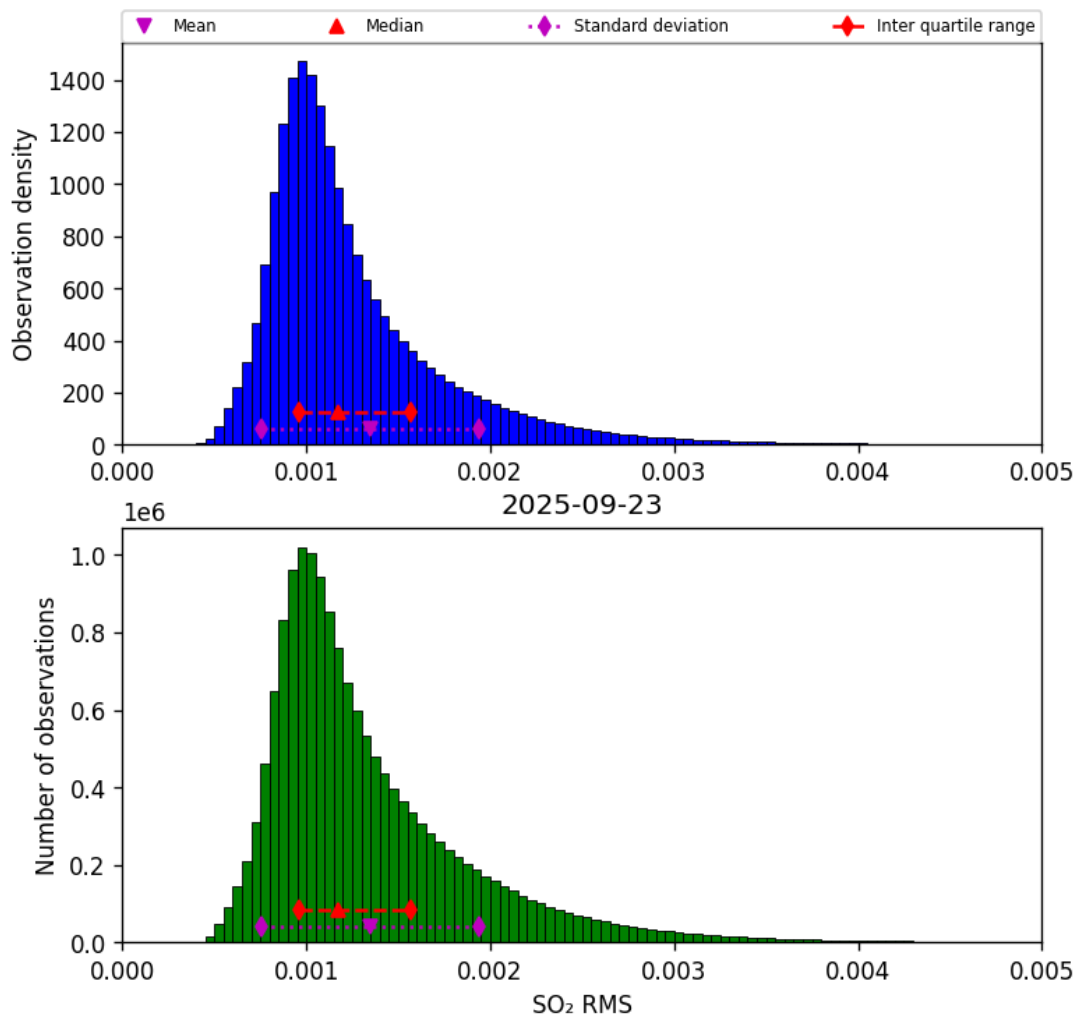


Figure 79: Histogram of “SO₂ RMS” for 2025-09-23 to 2025-09-23

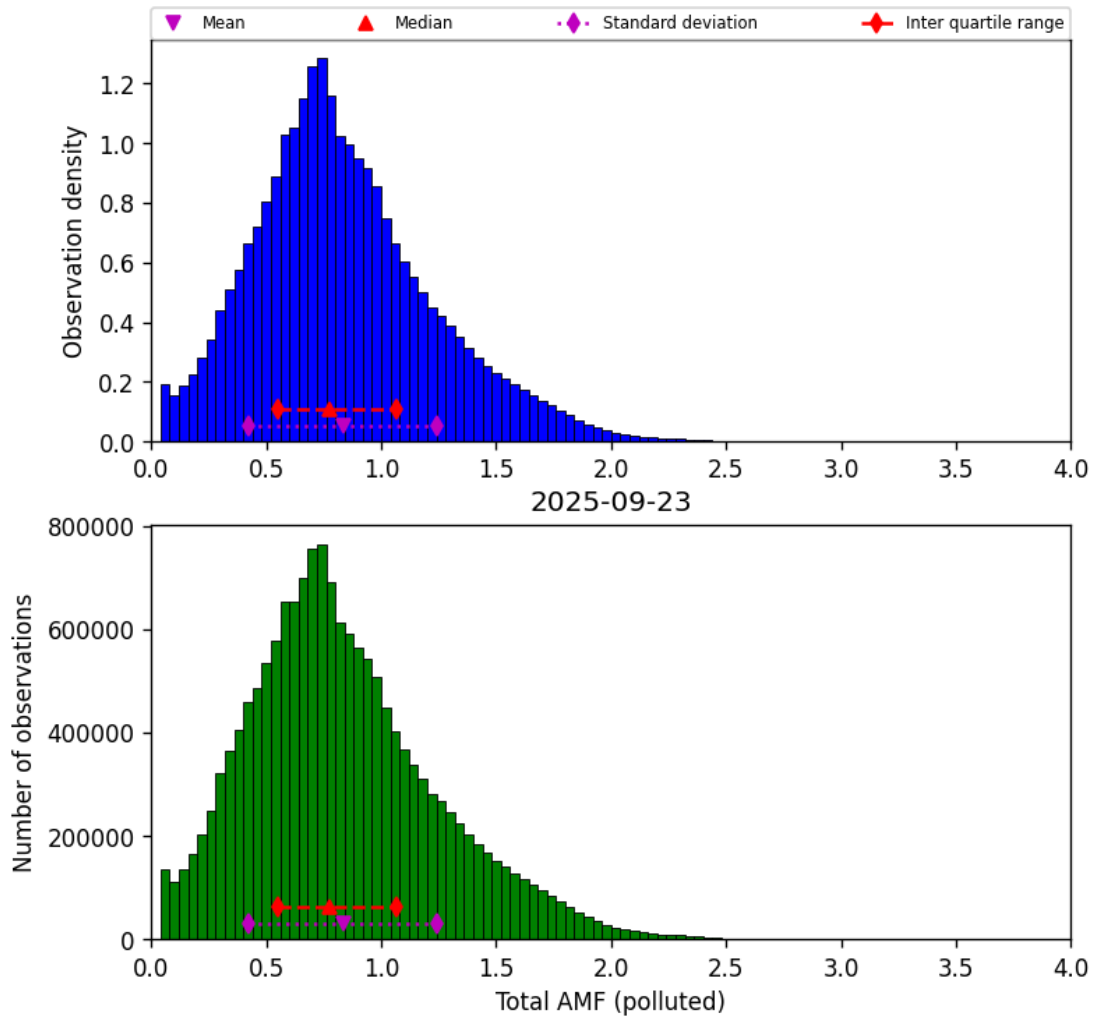


Figure 80: Histogram of “Total AMF (polluted)” for 2025-09-23 to 2025-09-23

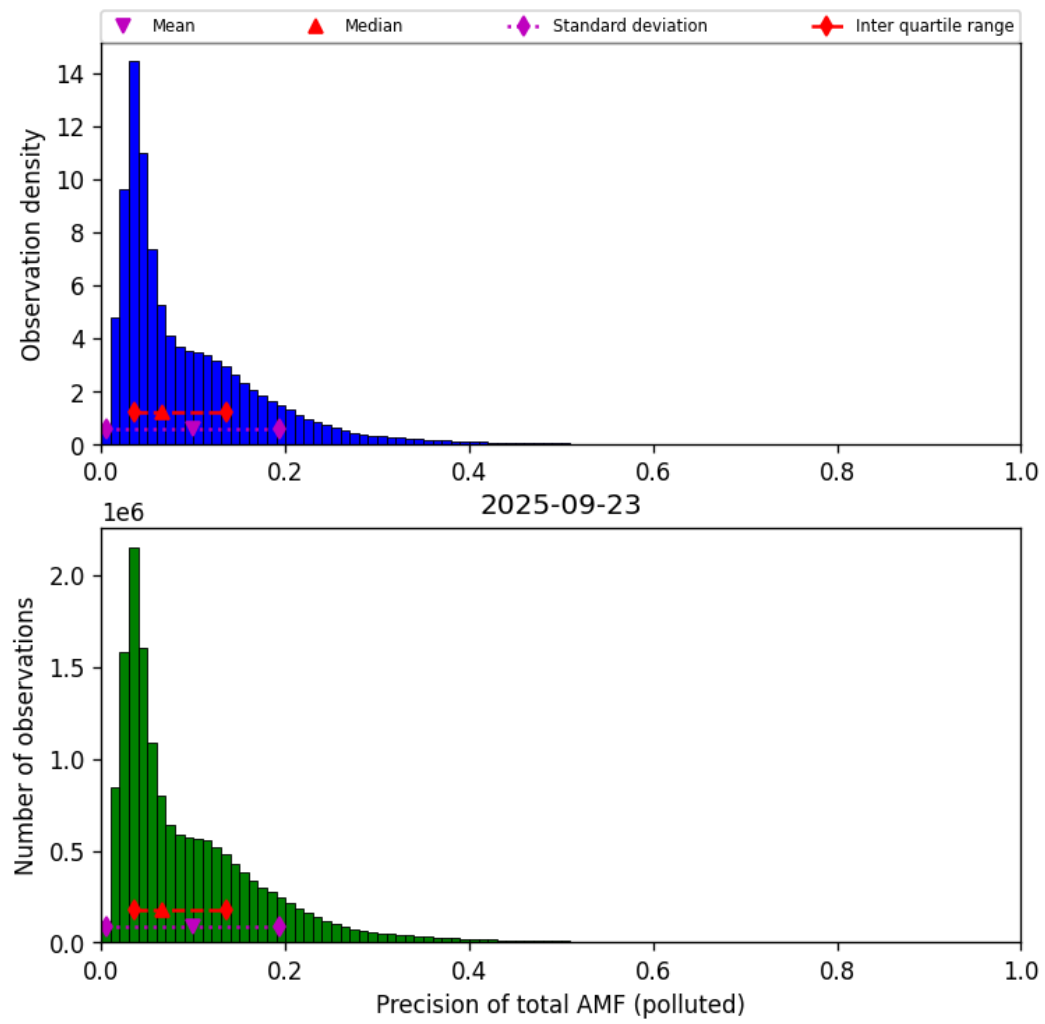


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-09-23 to 2025-09-23

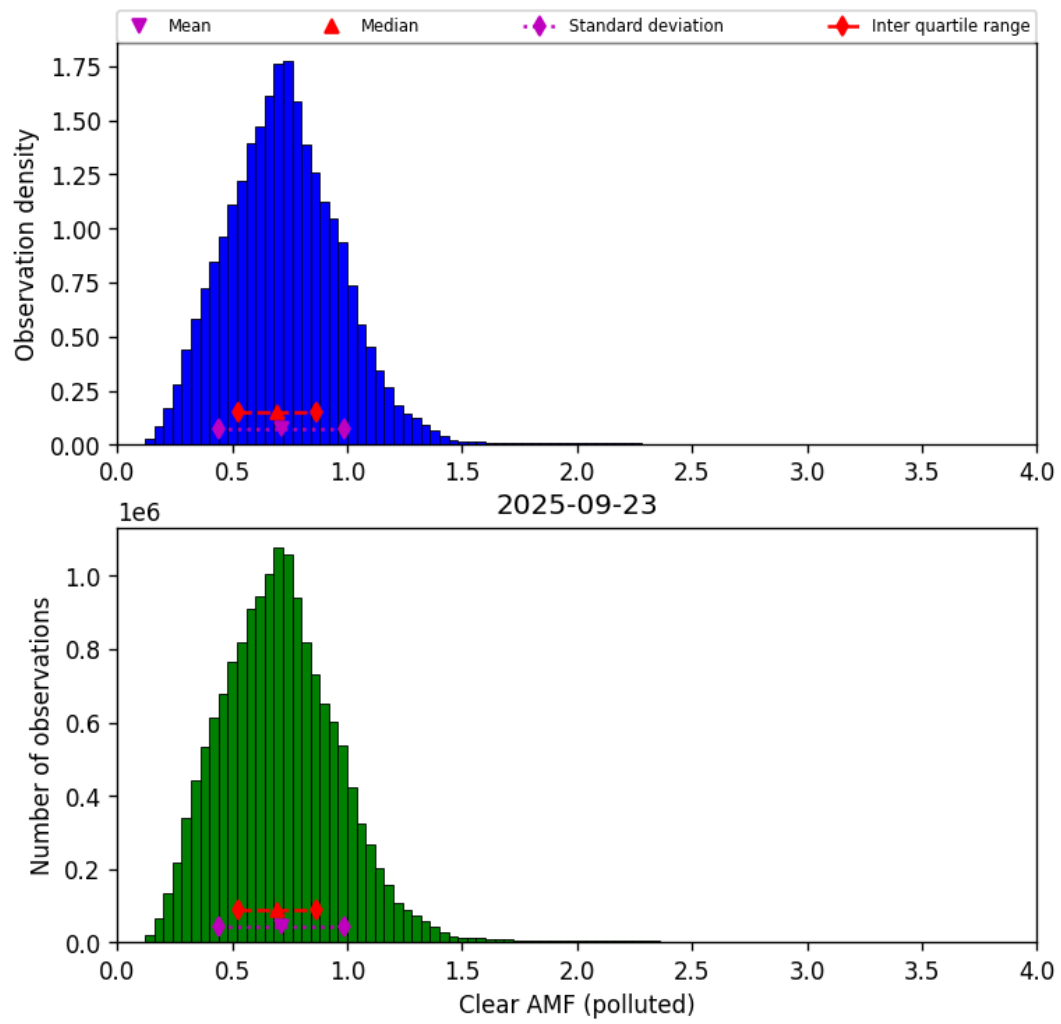


Figure 82: Histogram of "Clear AMF (polluted)" for 2025-09-23 to 2025-09-23

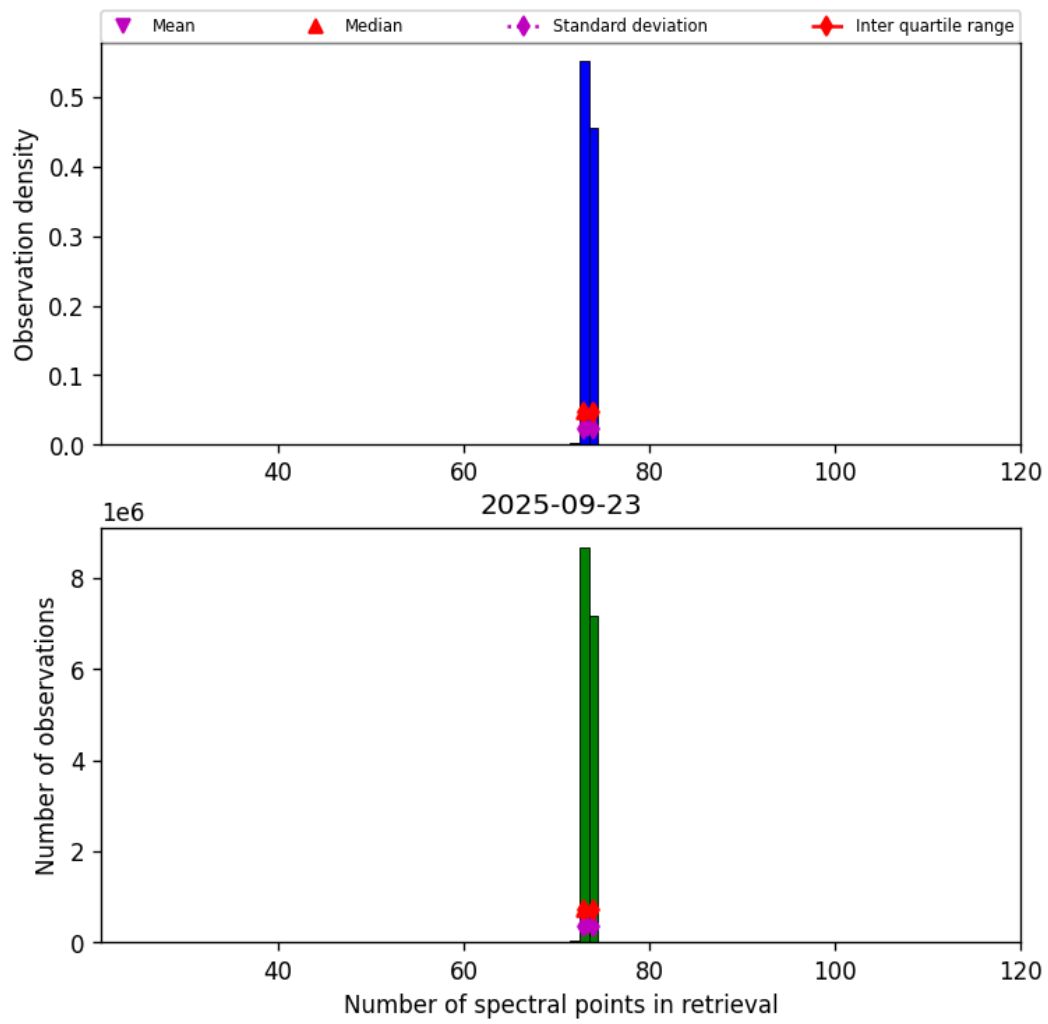


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-09-23 to 2025-09-23

9 Along track statistics

The TROPOMI instrument uses different binned detector rows for different viewing directions. In this section statistics are presented for each of the binned rows in the instrument.

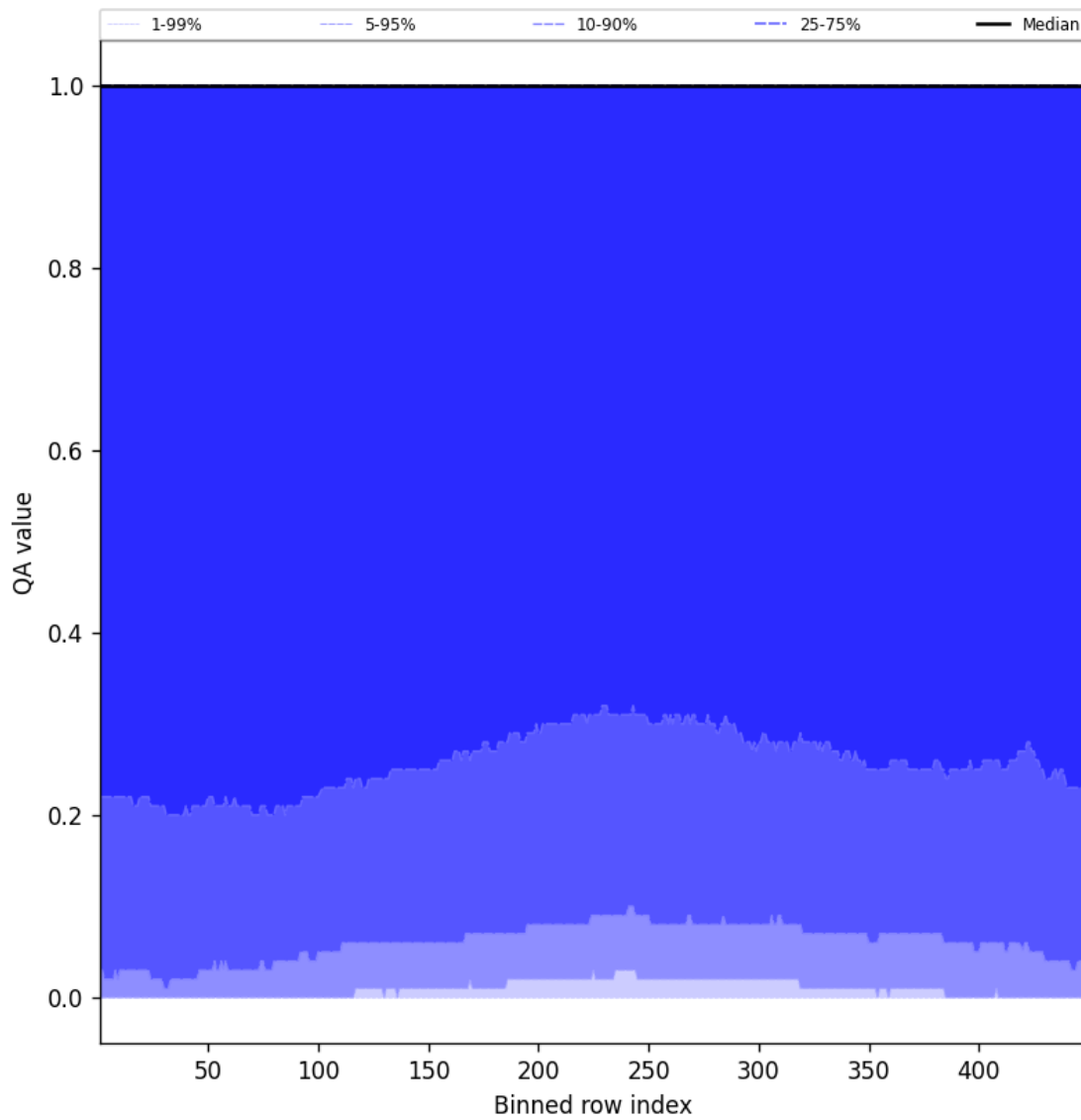


Figure 84: Along track statistics of “QA value” for 2025-09-23 to 2025-09-23

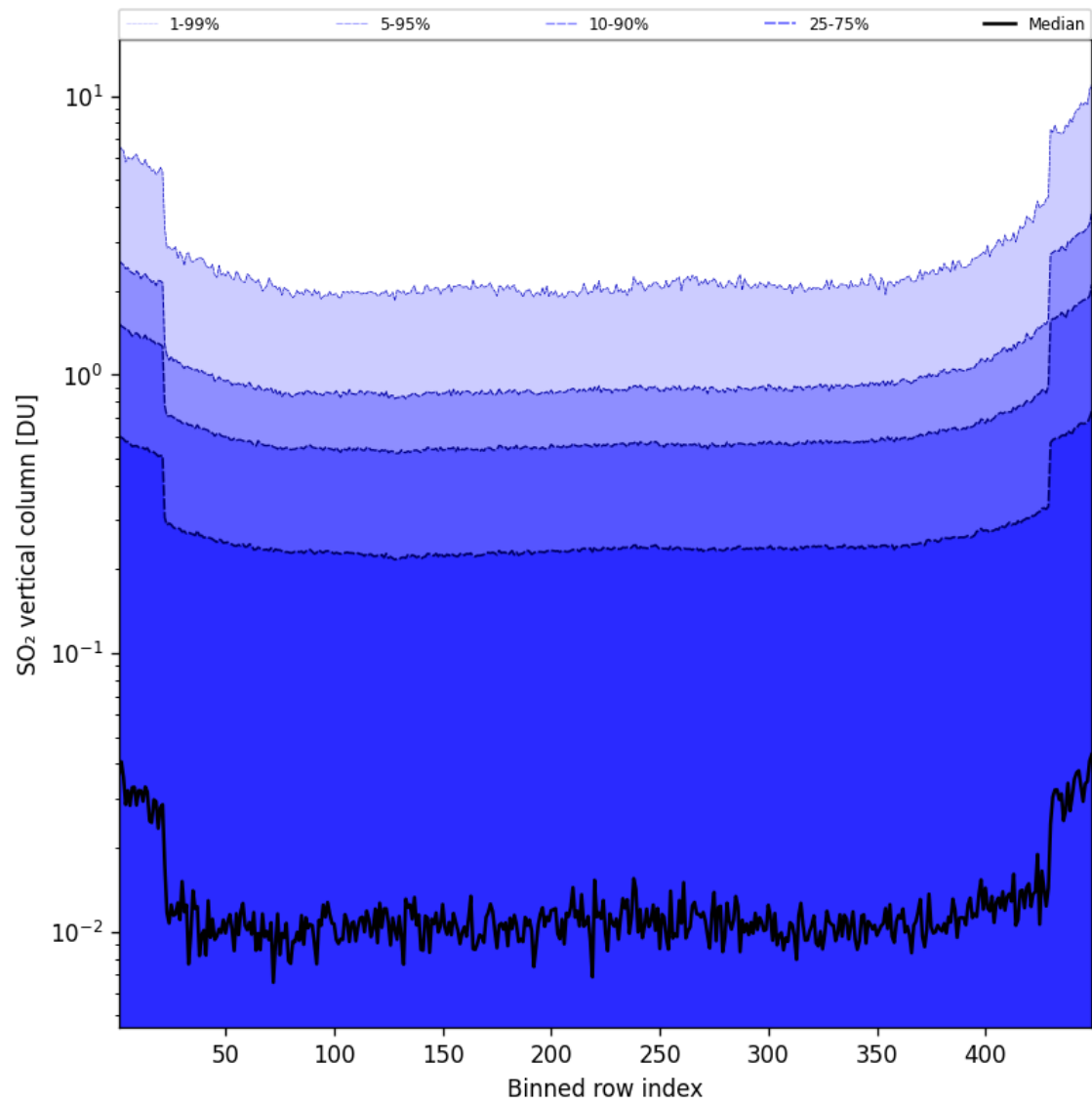


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-09-23 to 2025-09-23

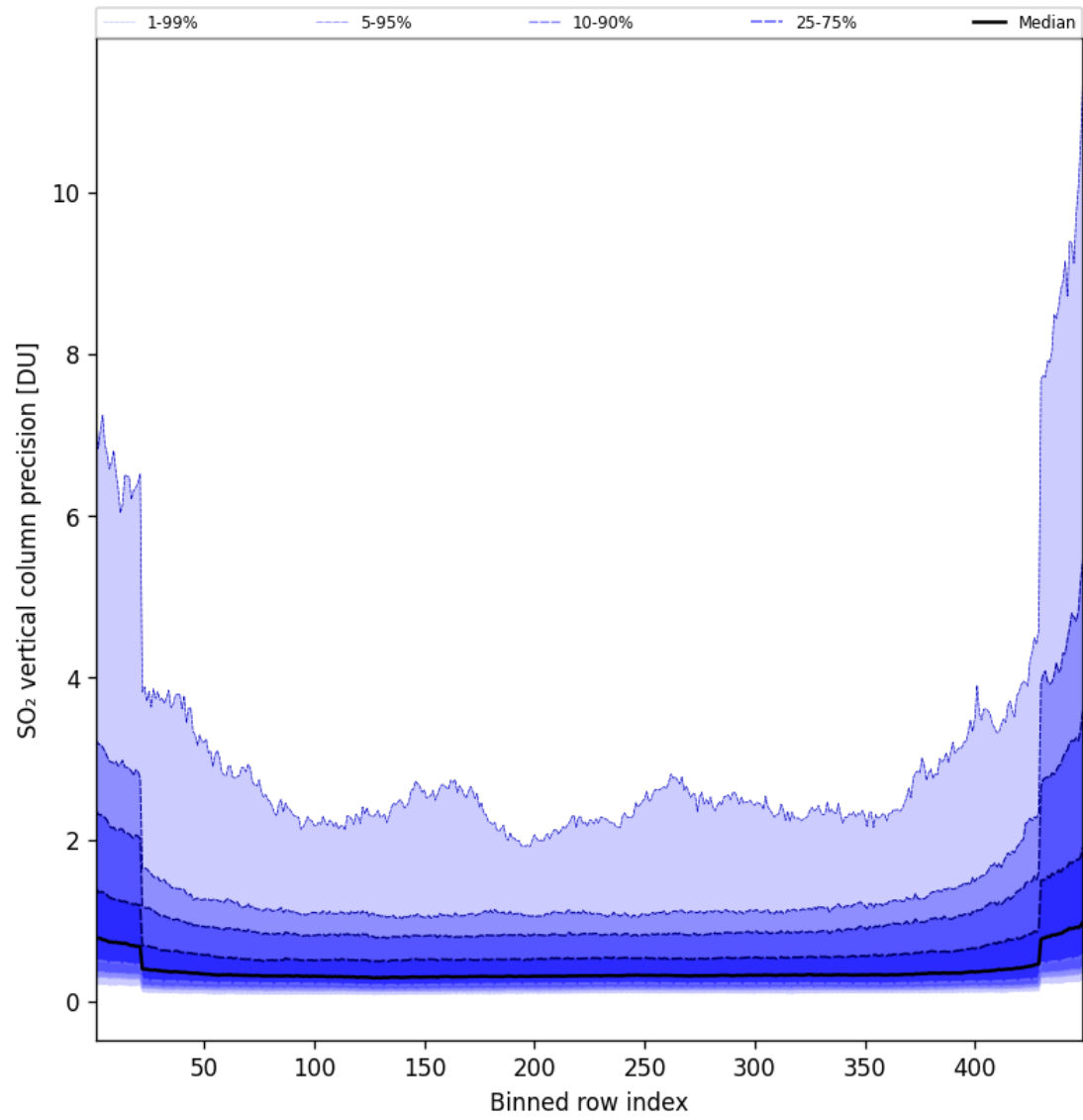


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-09-23 to 2025-09-23

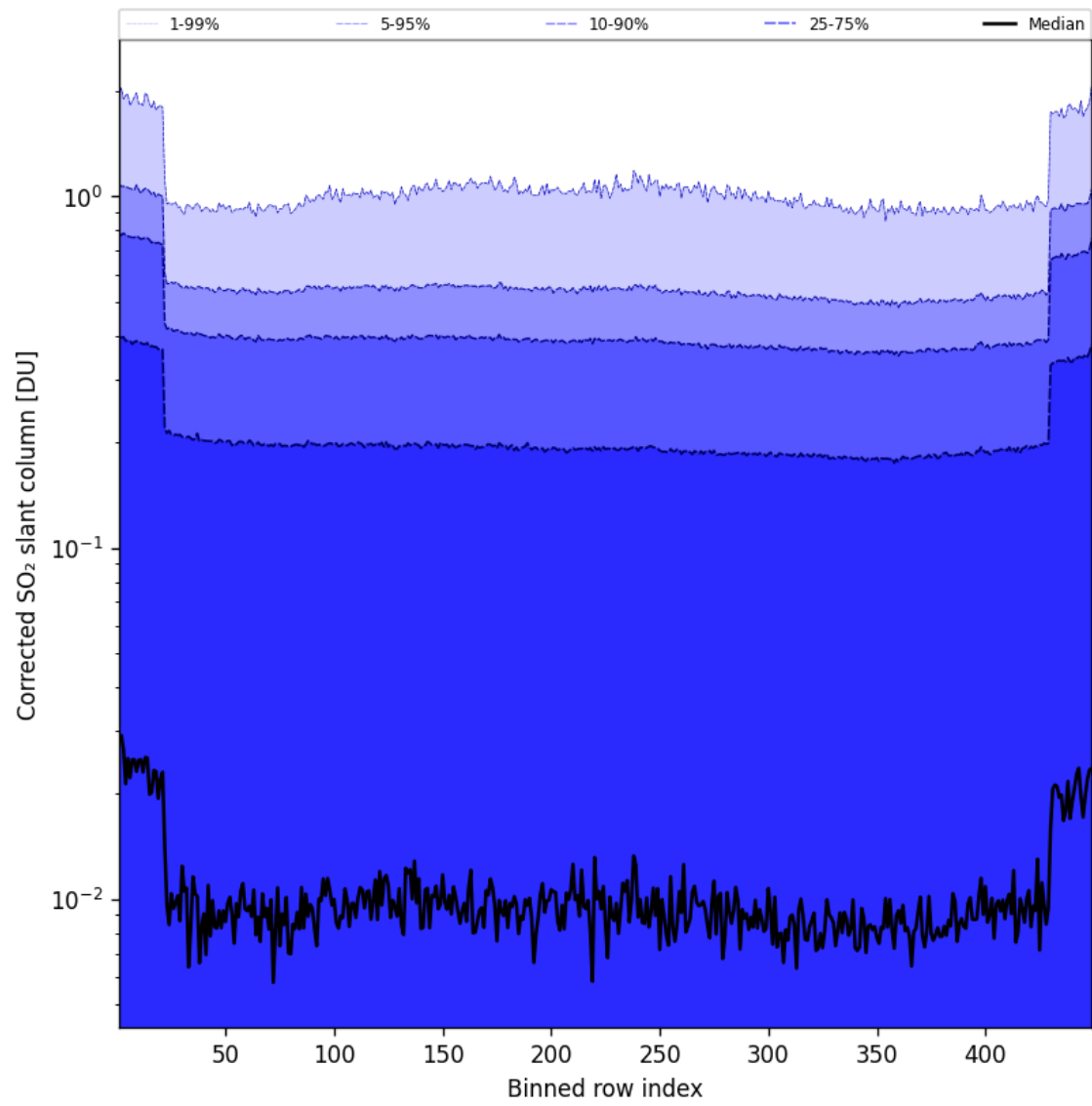


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-09-23 to 2025-09-23

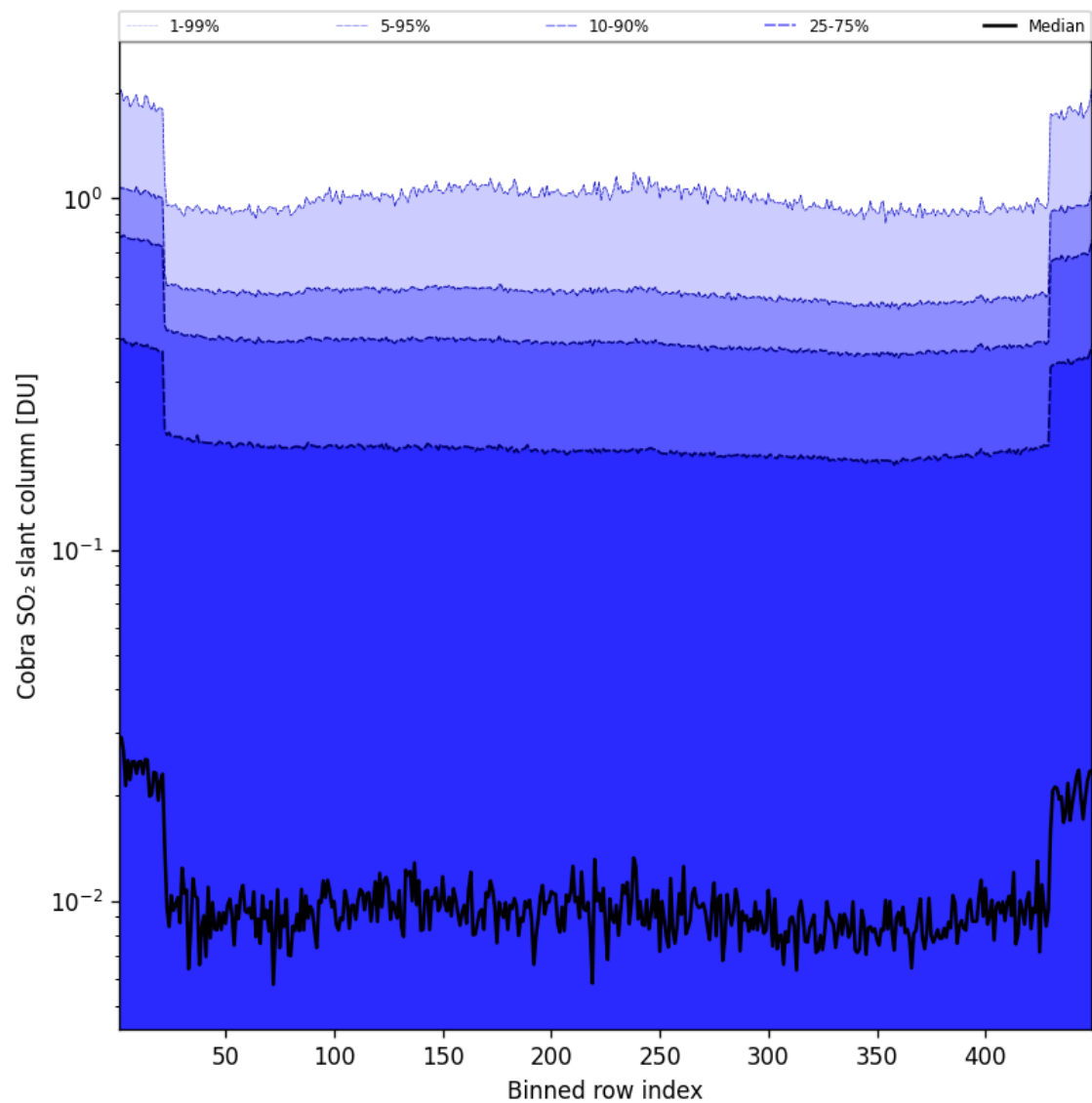


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-09-23 to 2025-09-23

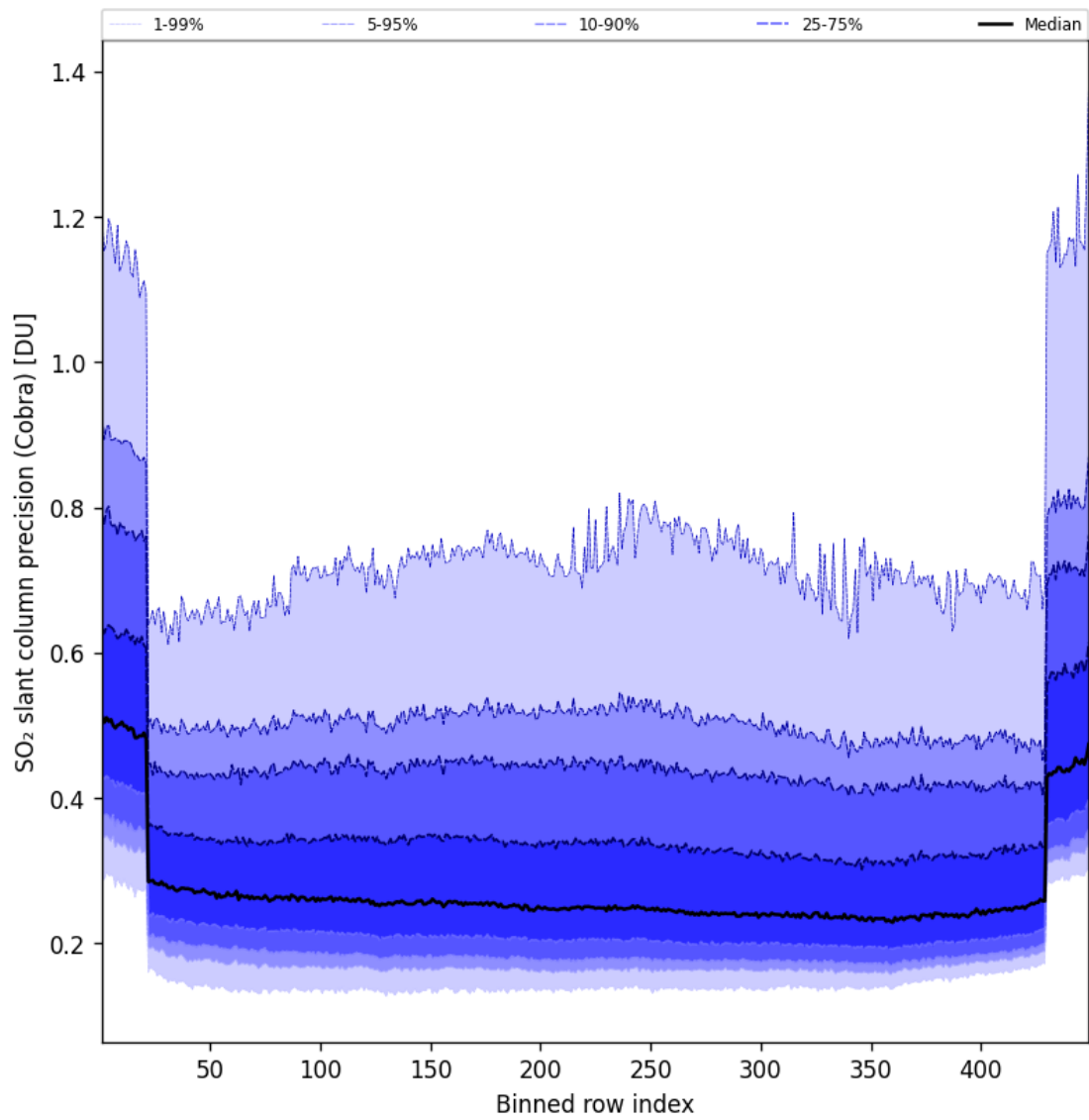


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-09-23 to 2025-09-23

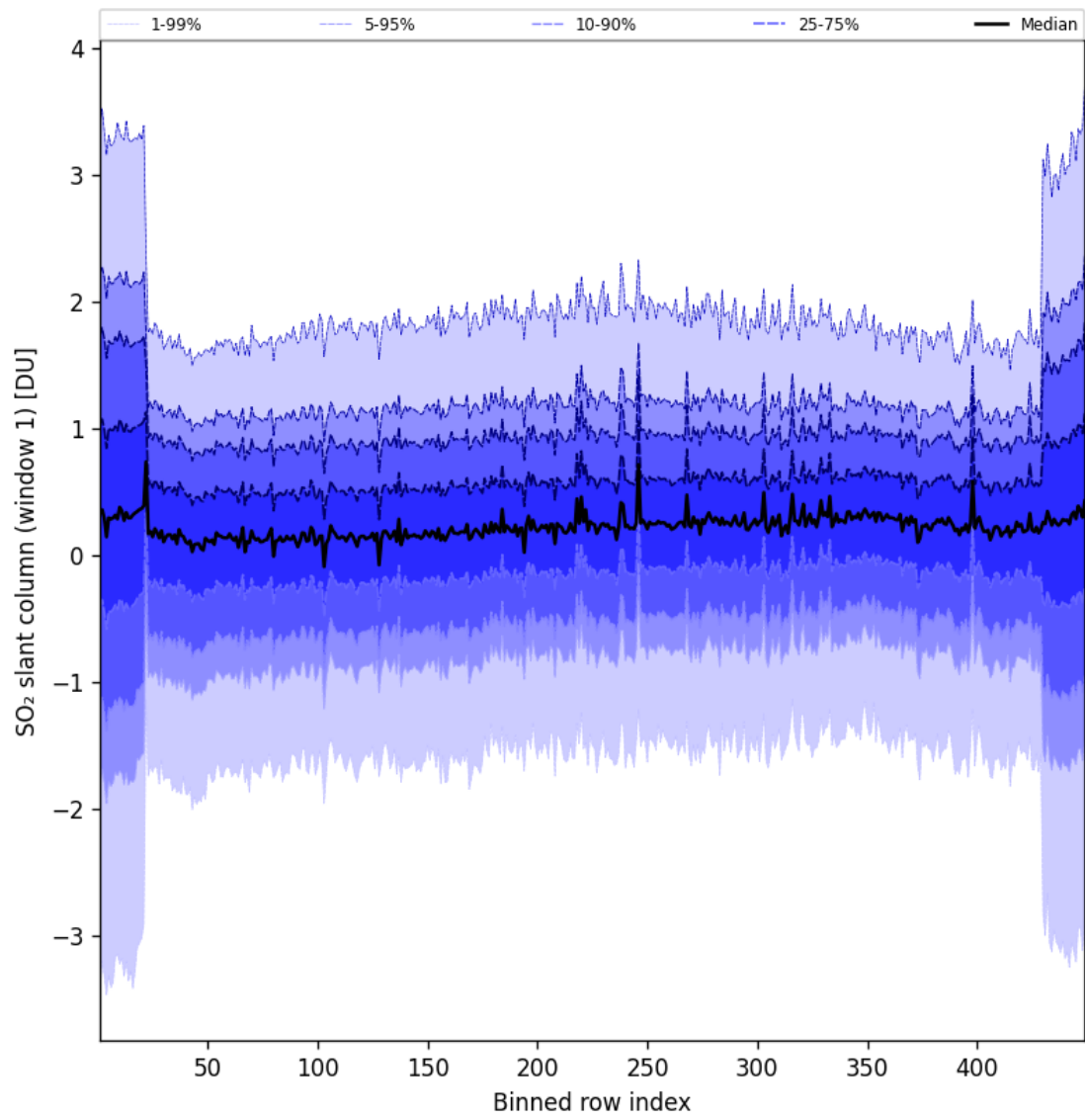


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-09-23 to 2025-09-23

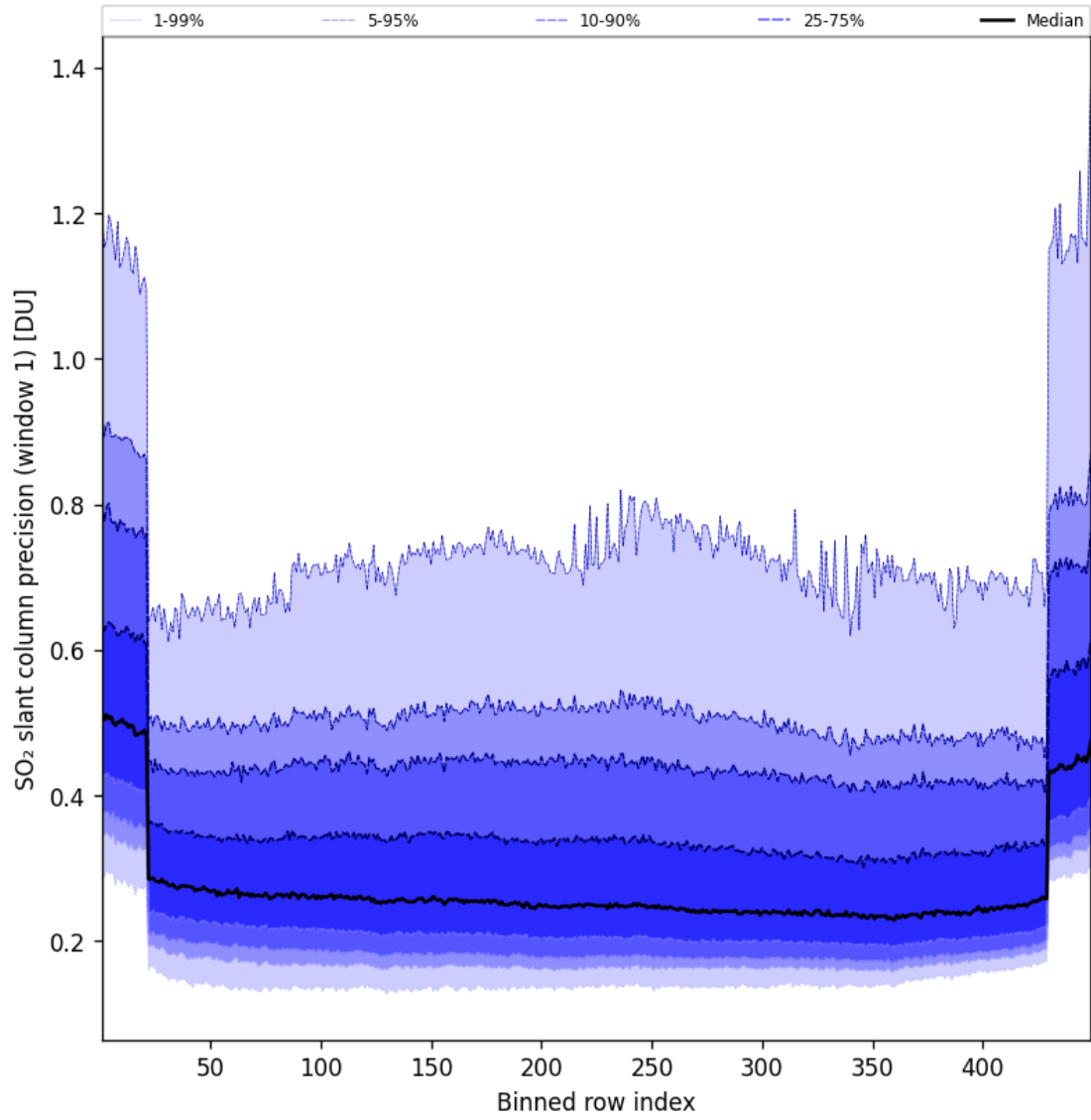


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-09-23 to 2025-09-23

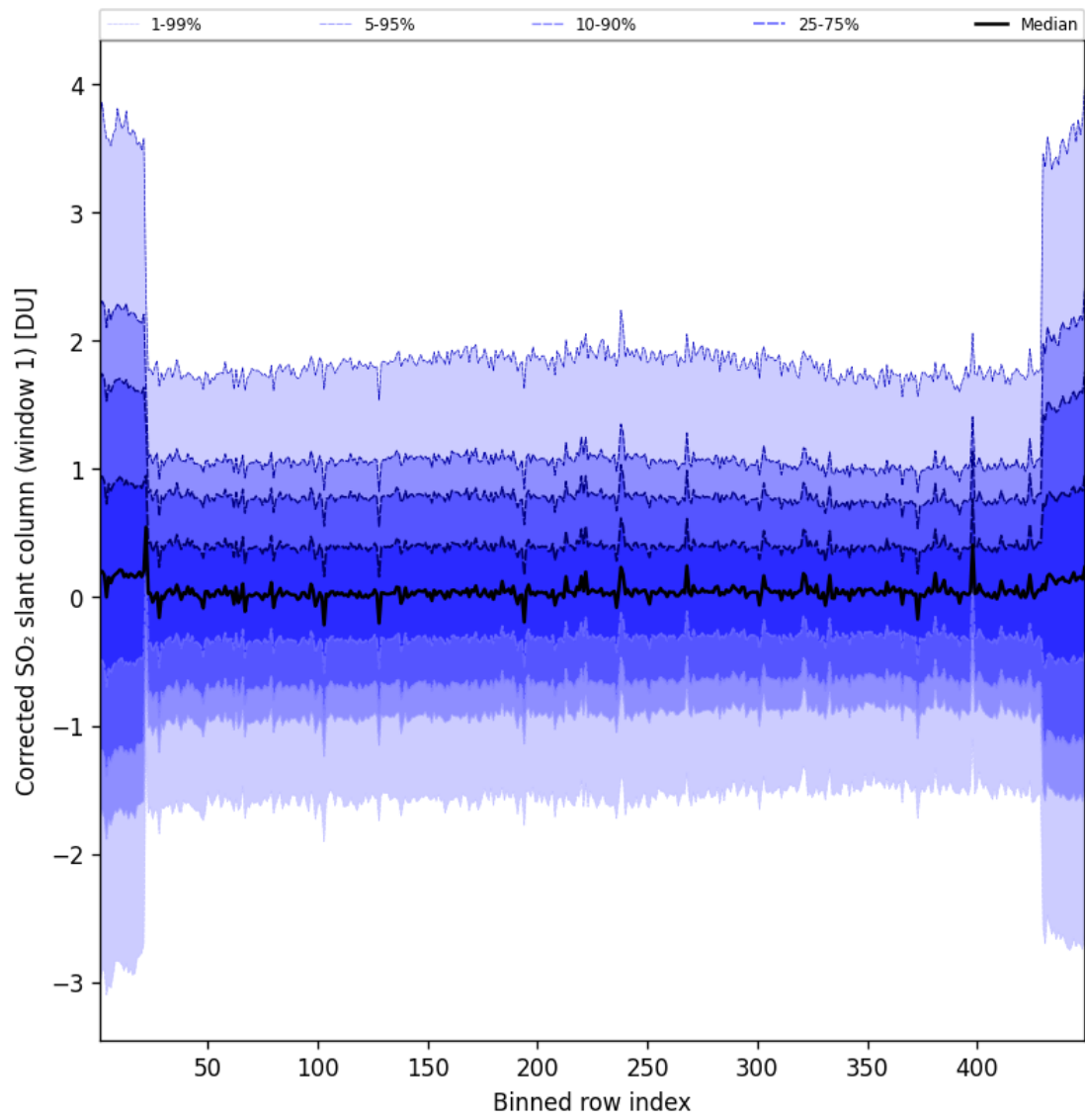


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-09-23 to 2025-09-23

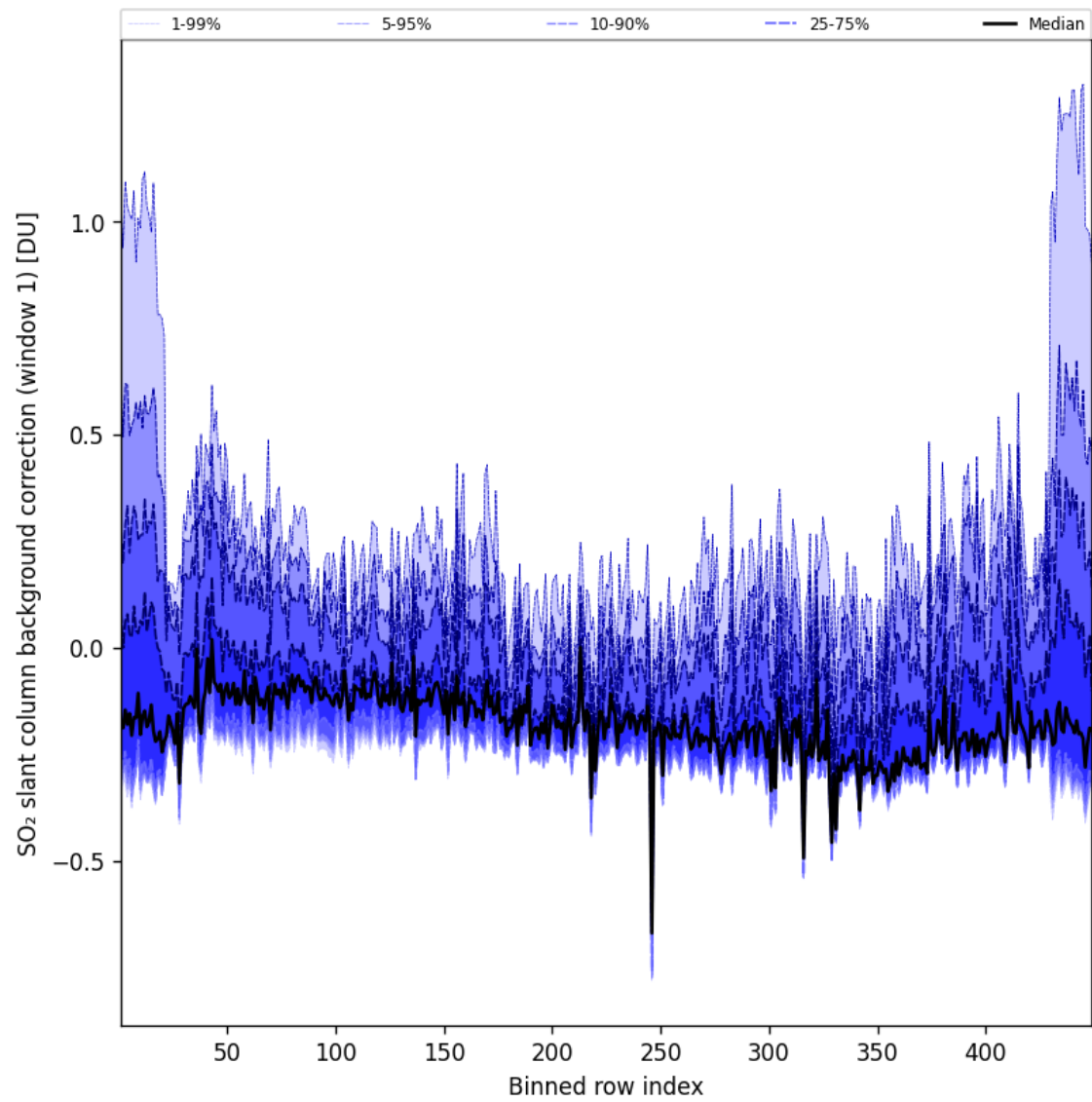


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-09-23 to 2025-09-23

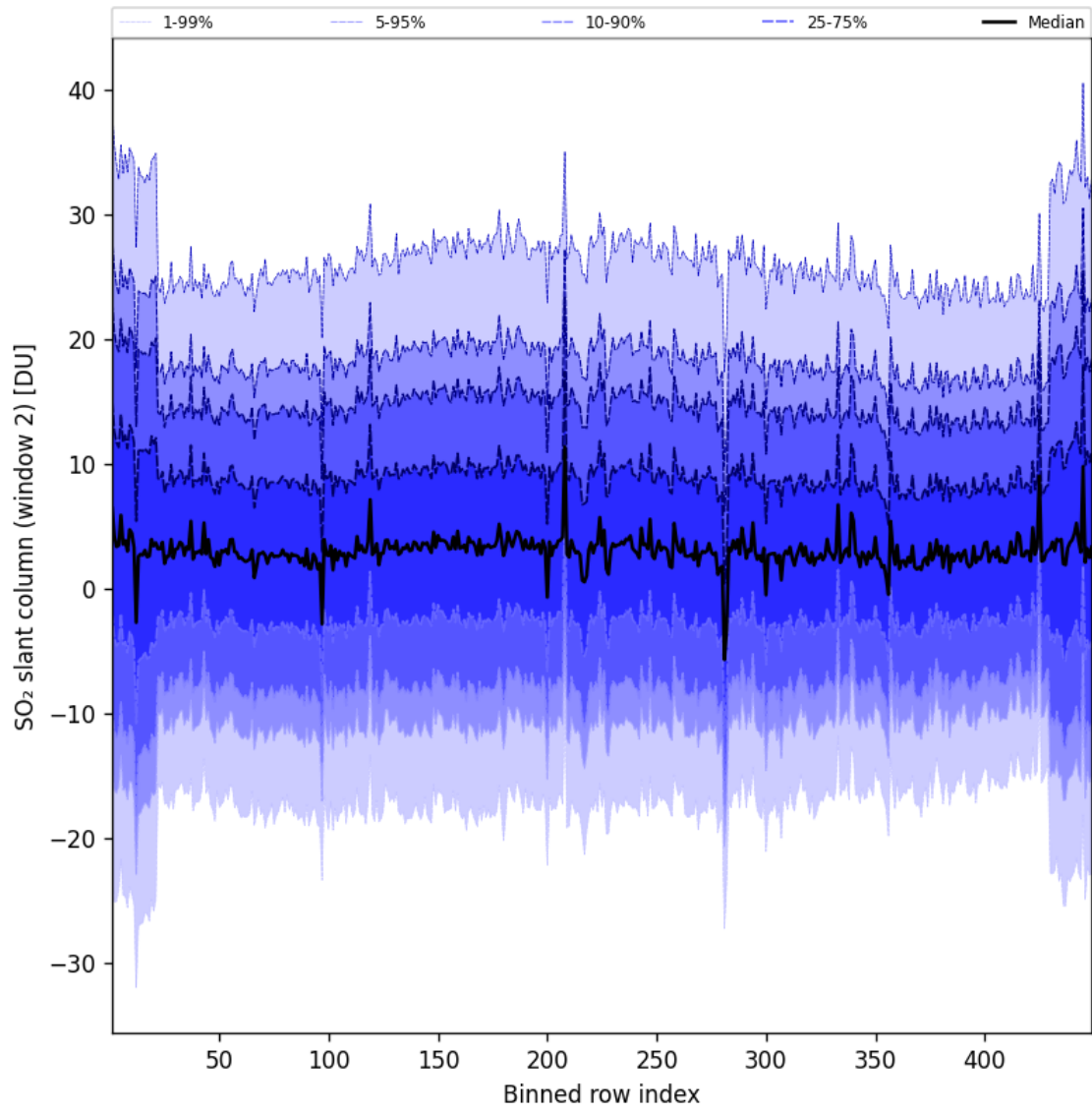


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-09-23 to 2025-09-23

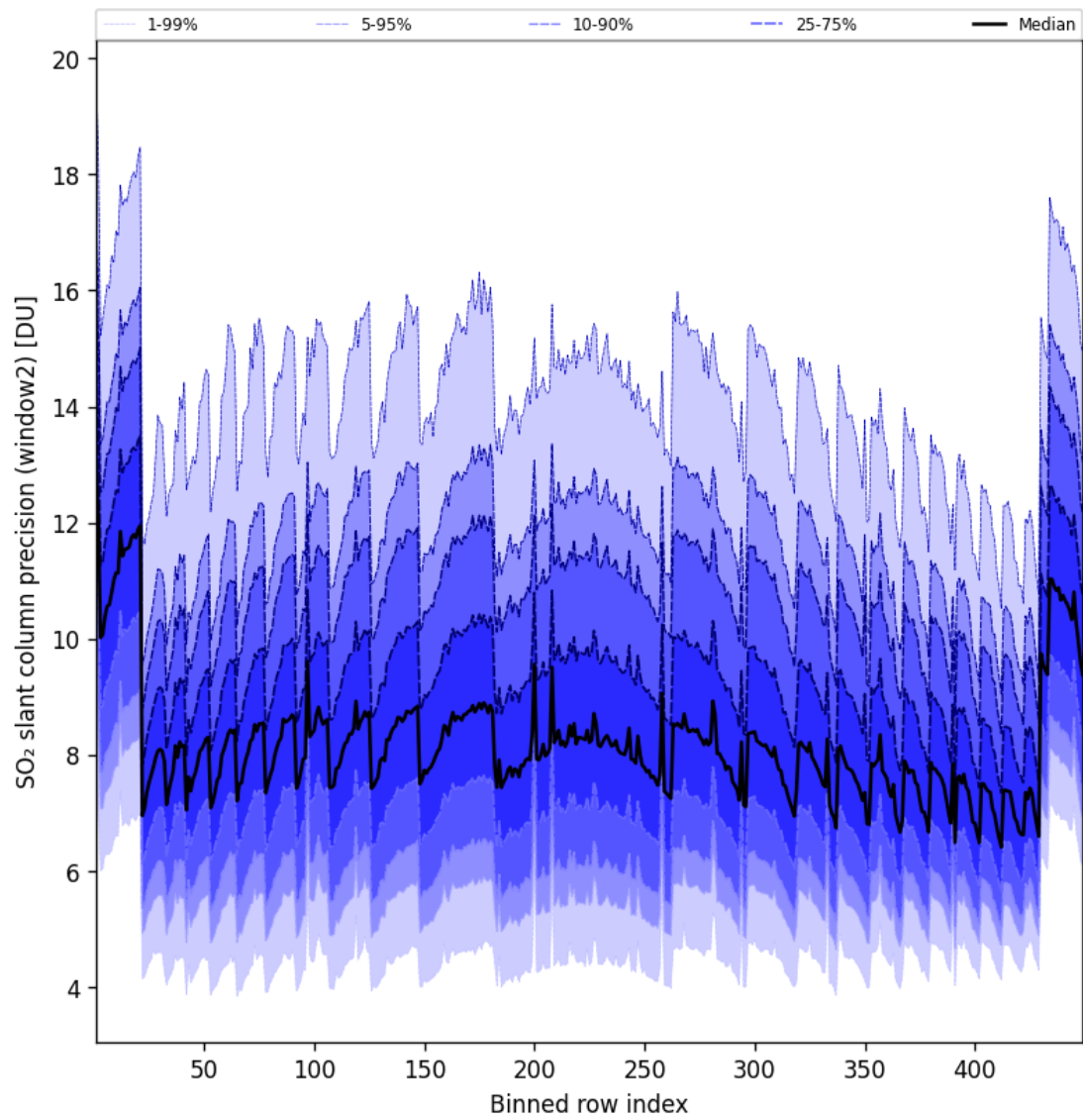


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-09-23 to 2025-09-23

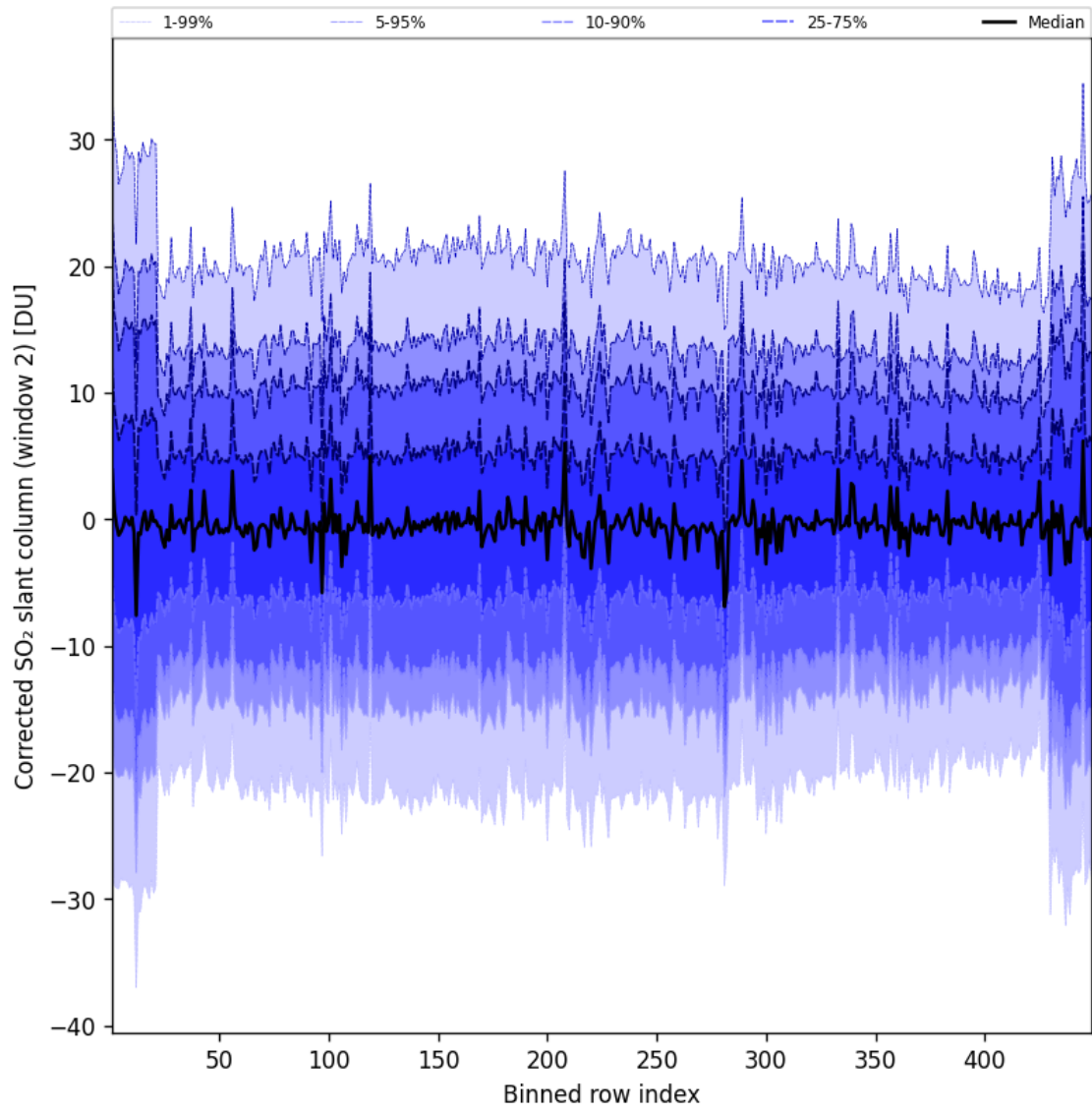


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-09-23 to 2025-09-23

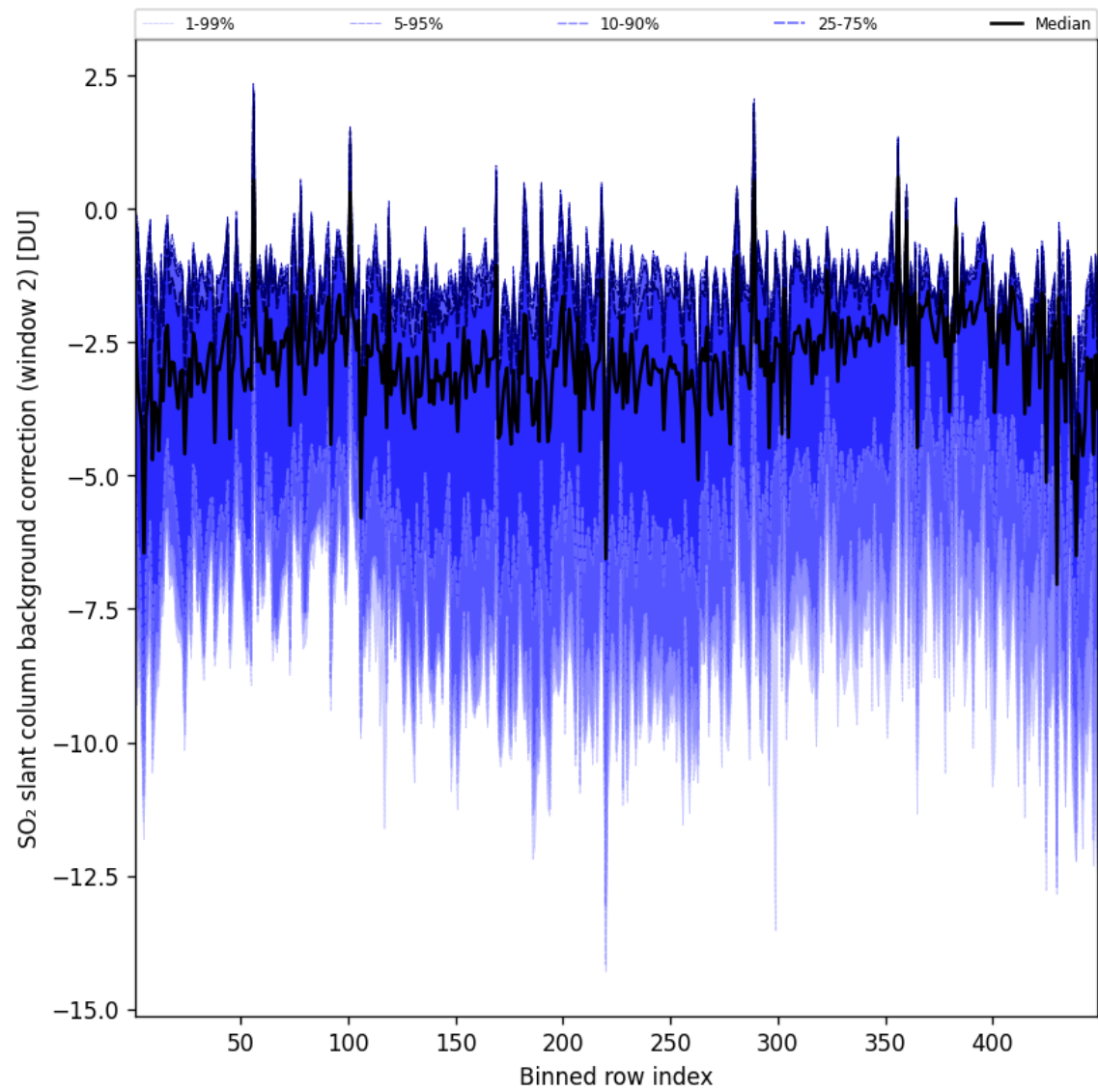


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-09-23 to 2025-09-23

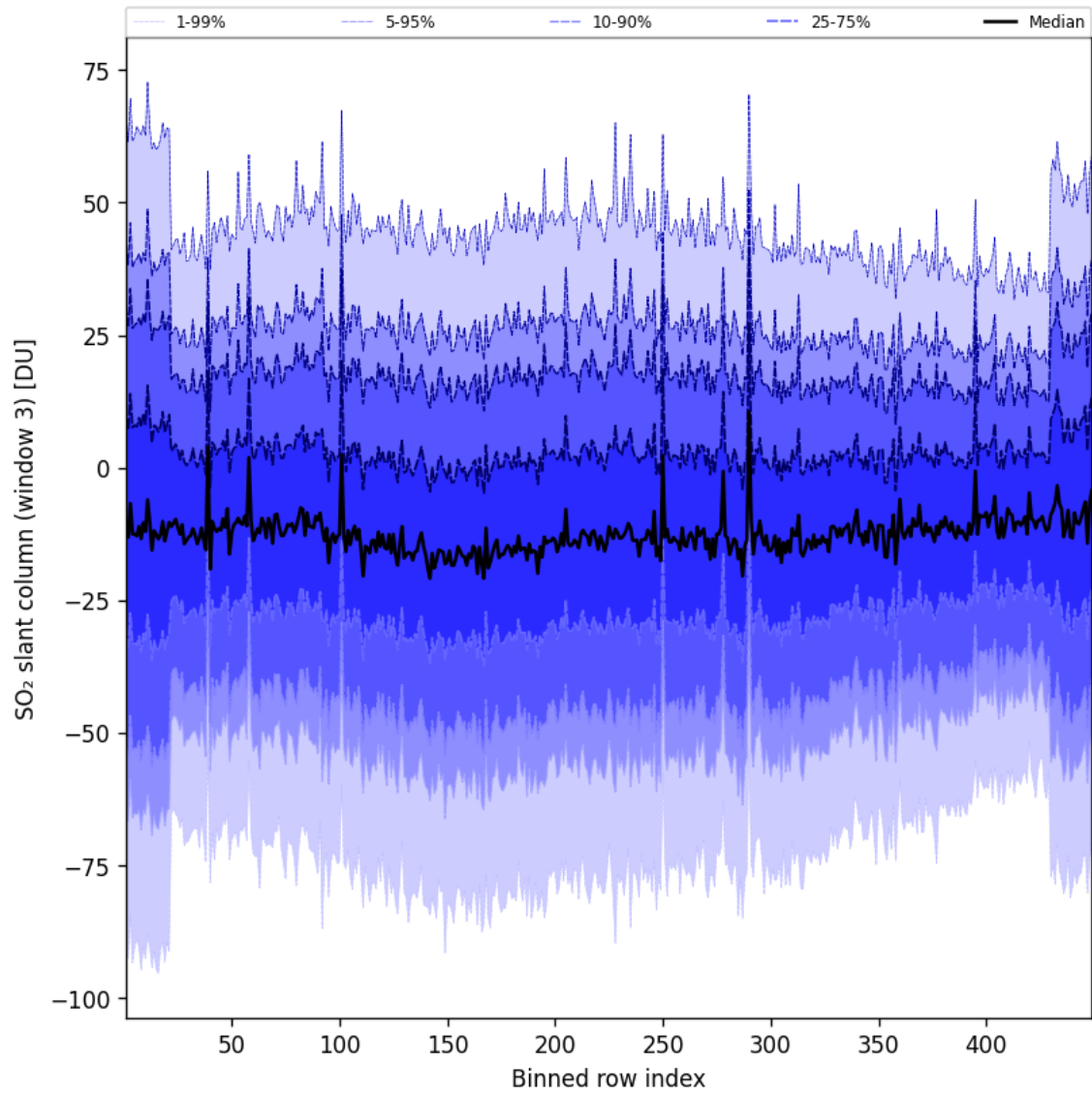


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-09-23 to 2025-09-23

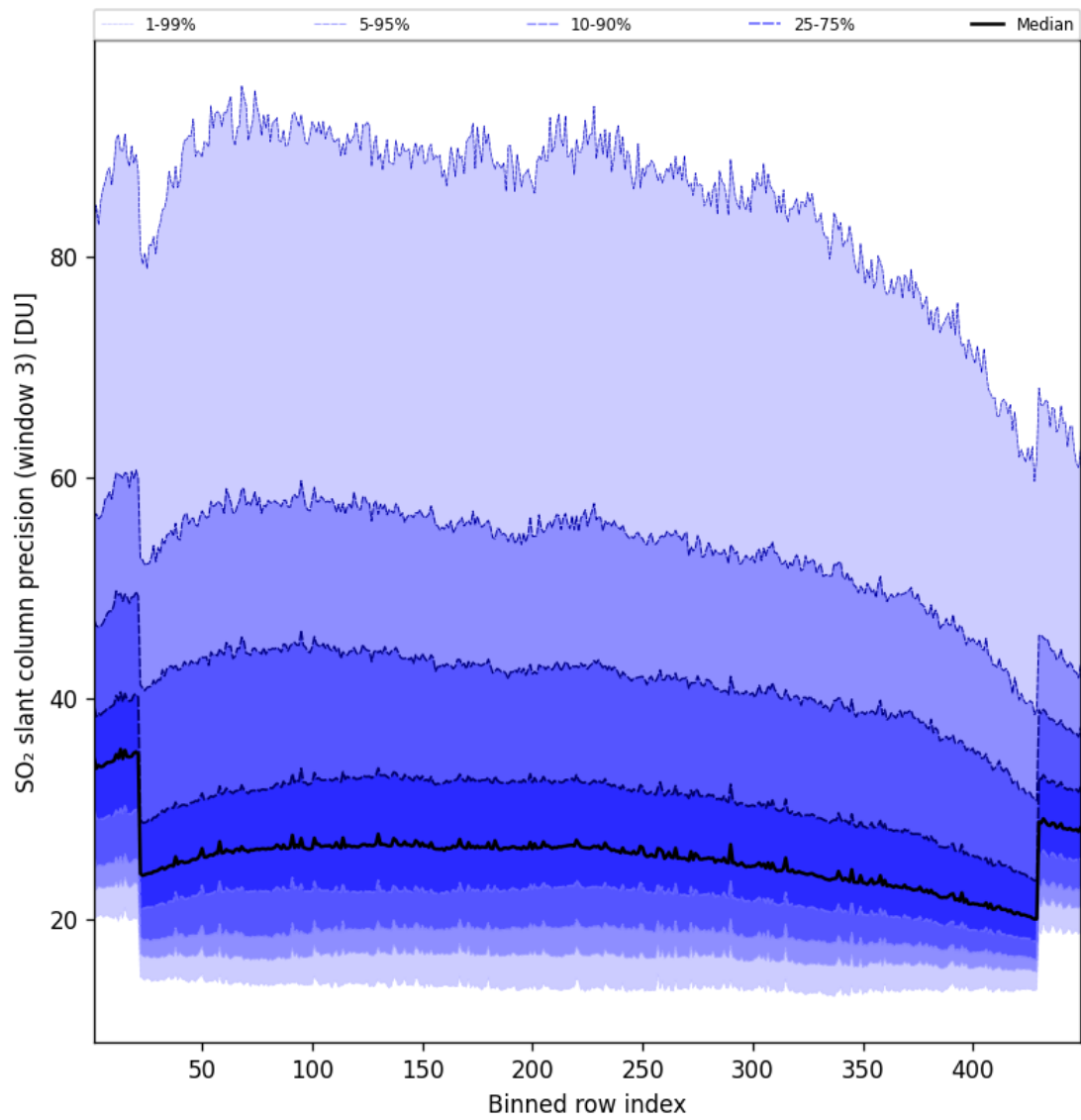


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-09-23 to 2025-09-23

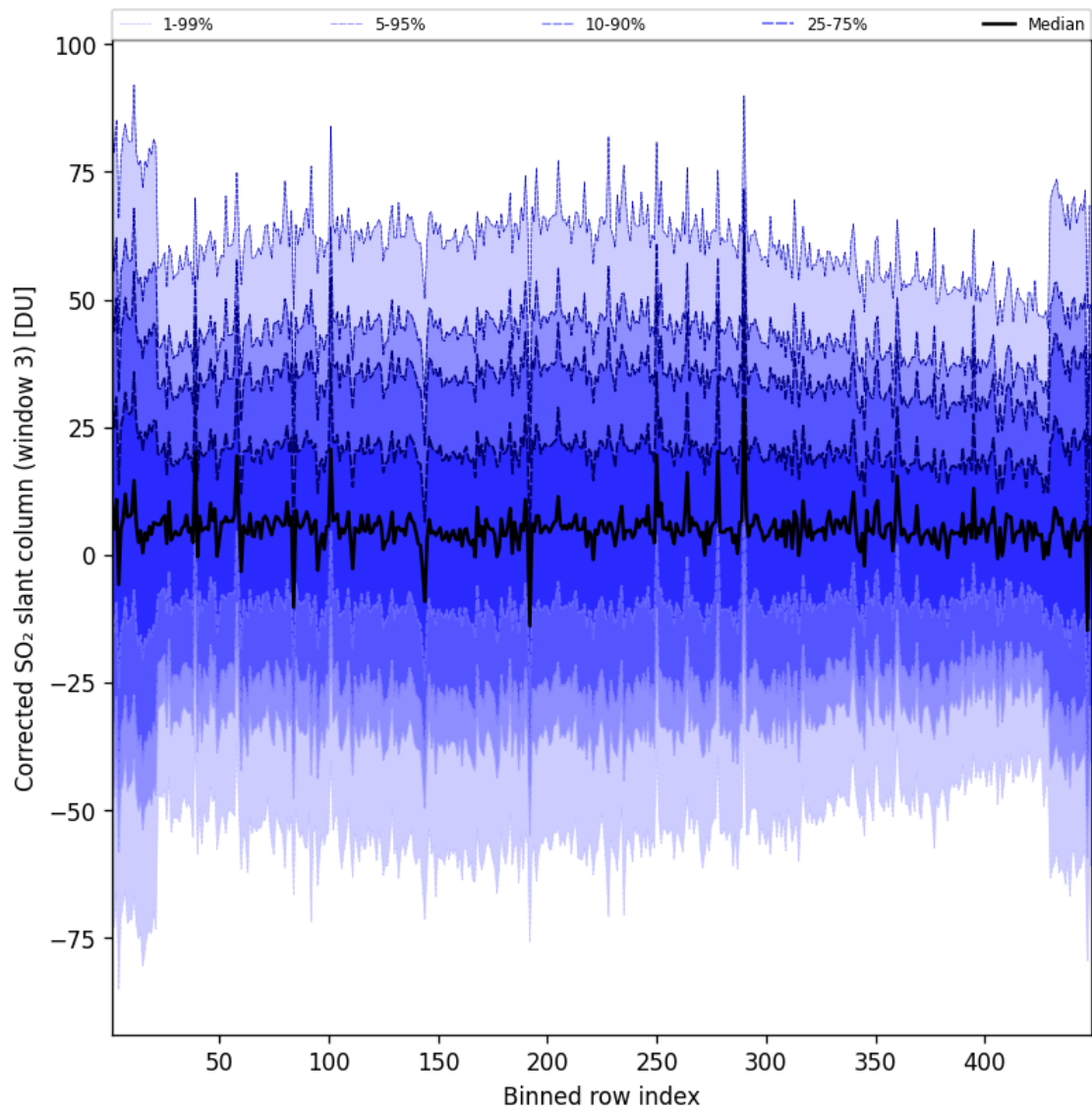


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-09-23 to 2025-09-23

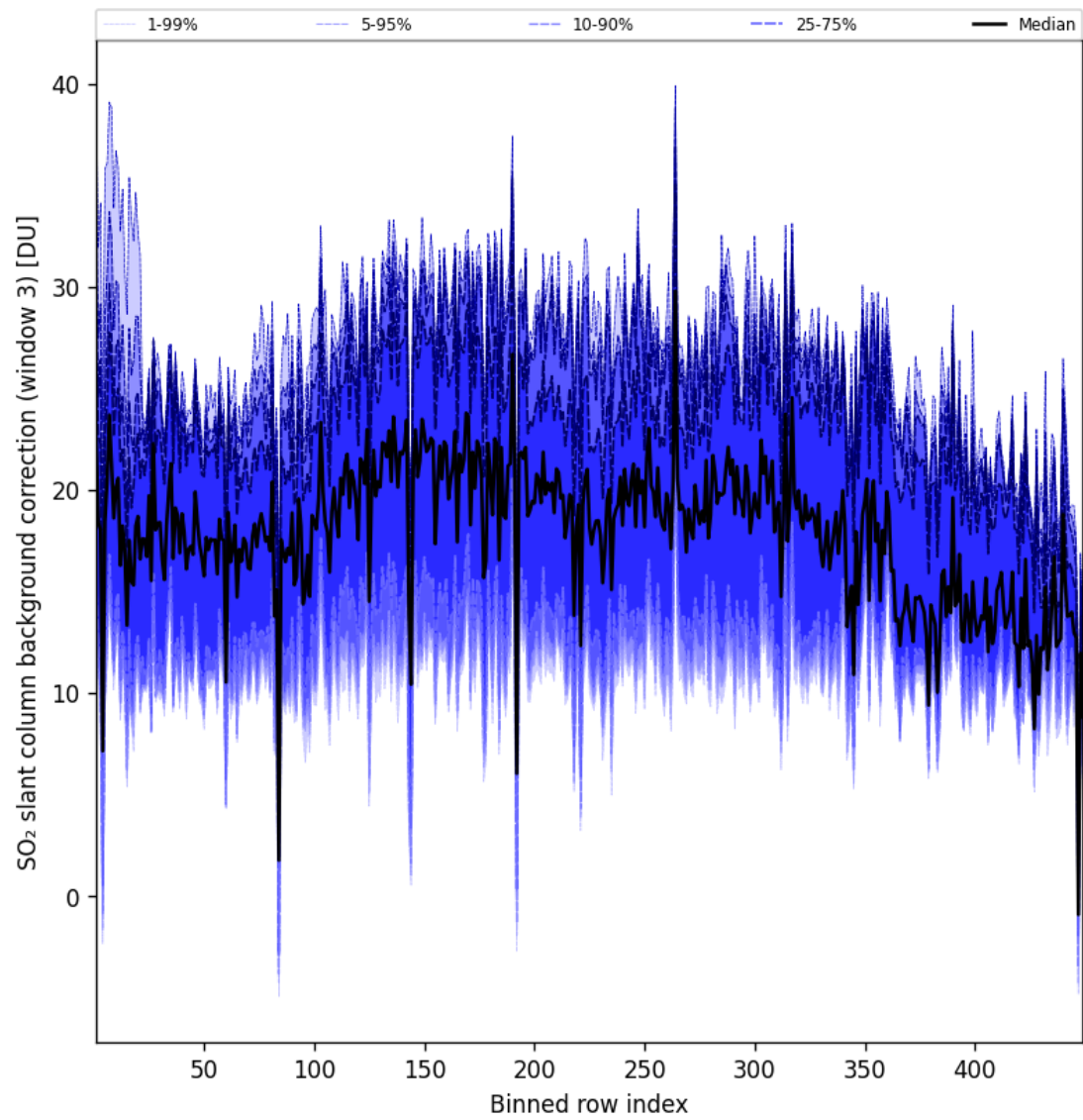


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-09-23 to 2025-09-23

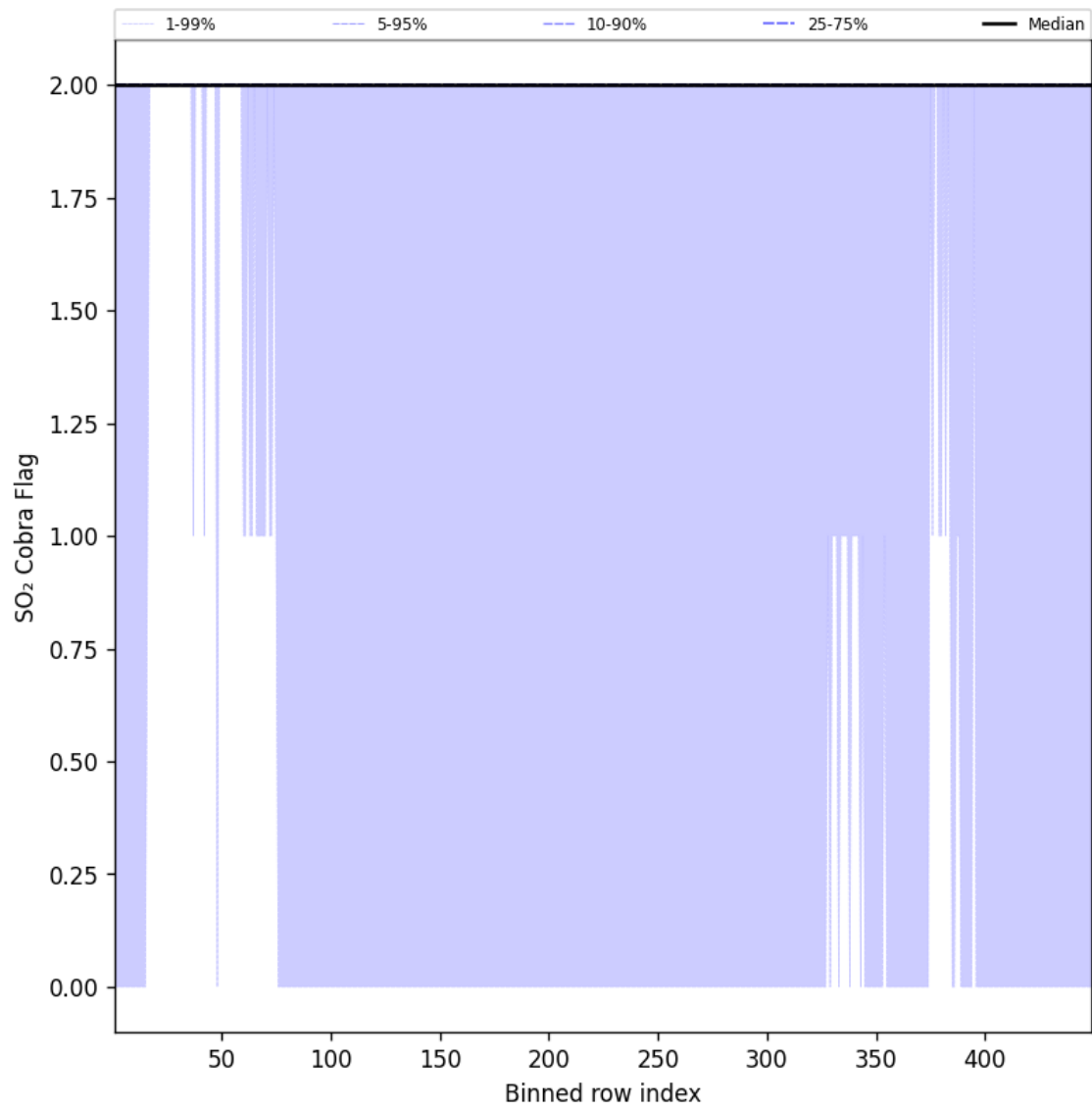


Figure 102: Along track statistics of "SO₂ Cobra Flag" for 2025-09-23 to 2025-09-23

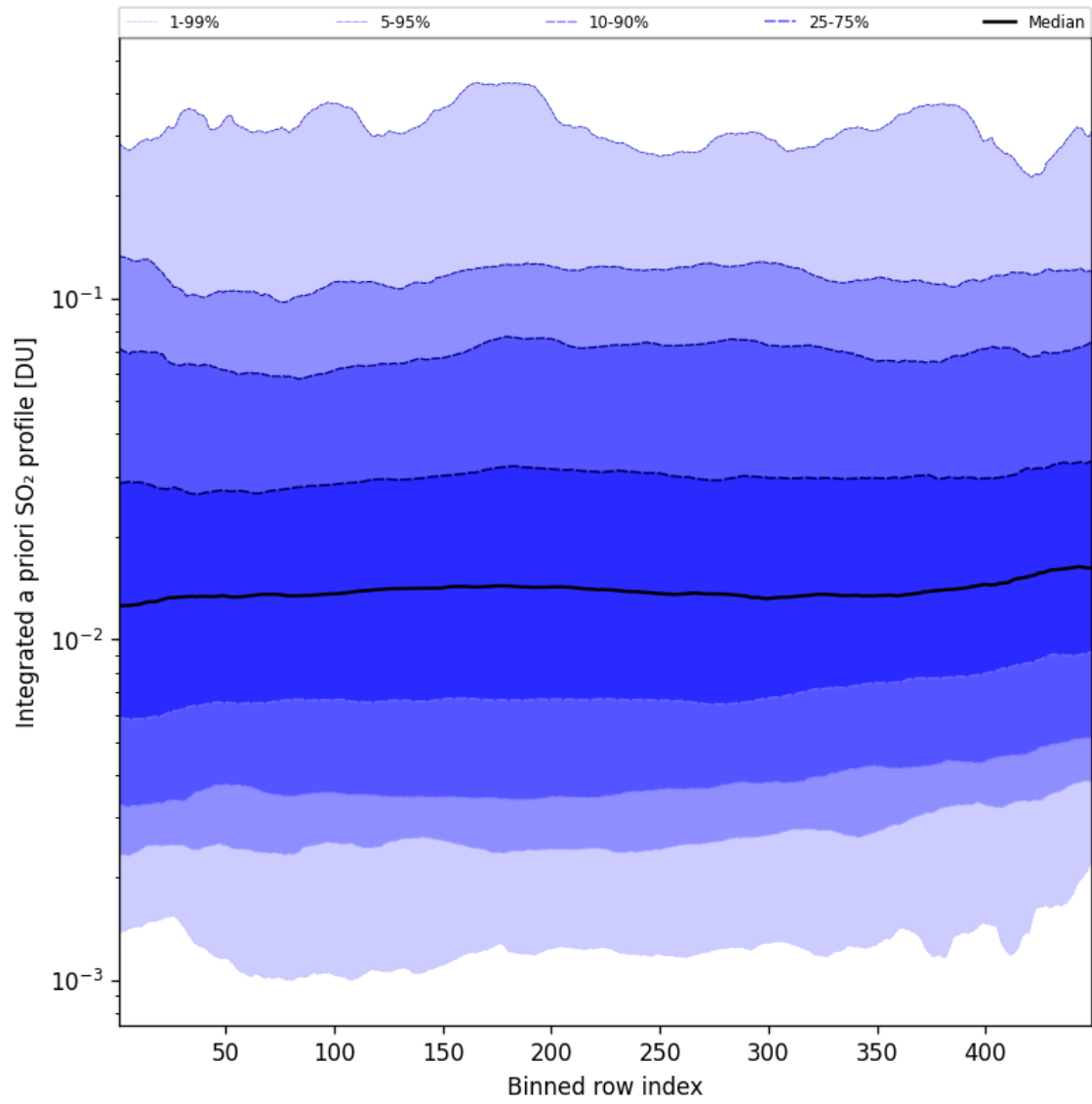


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-09-23 to 2025-09-23

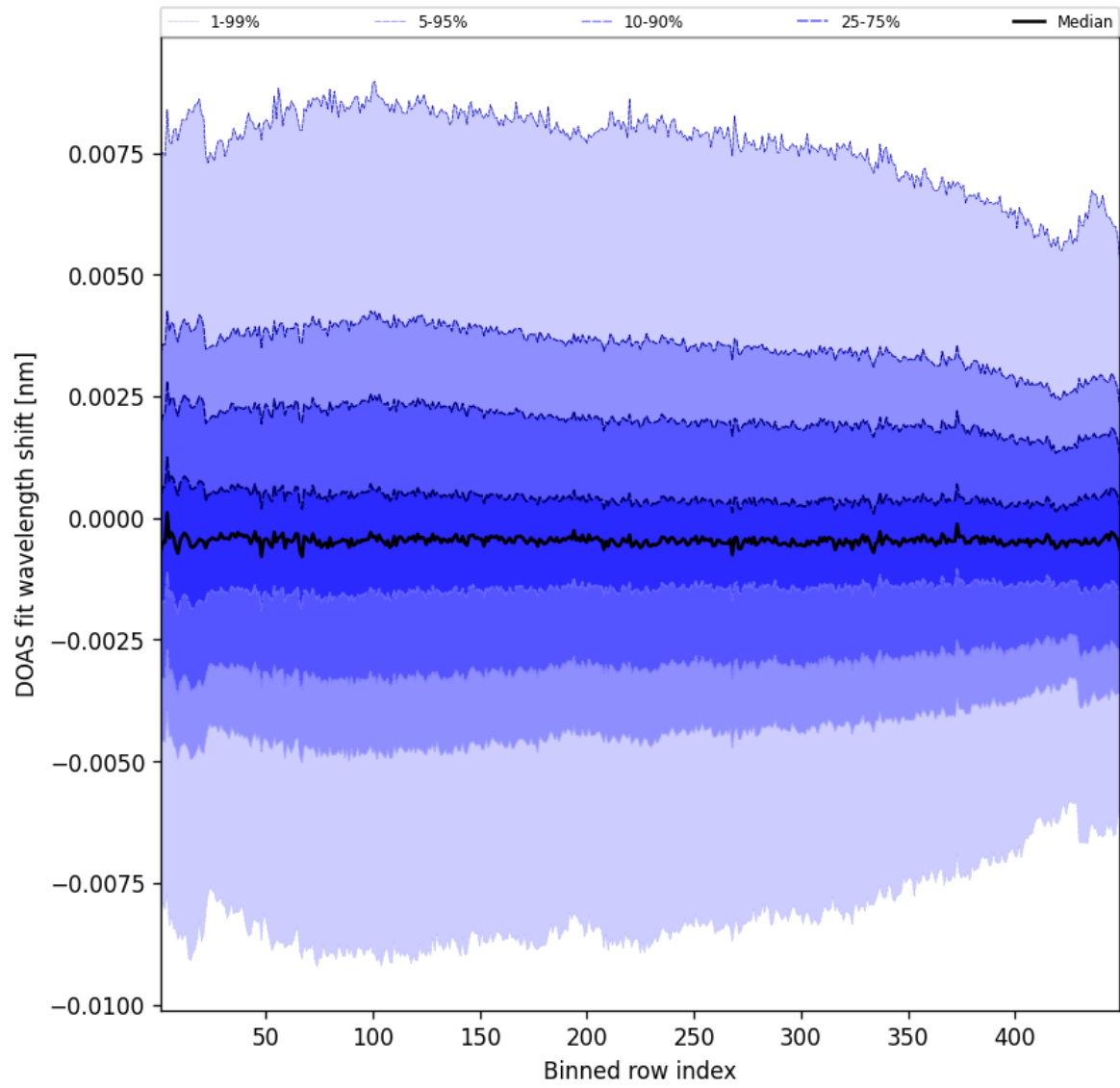


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-09-23 to 2025-09-23

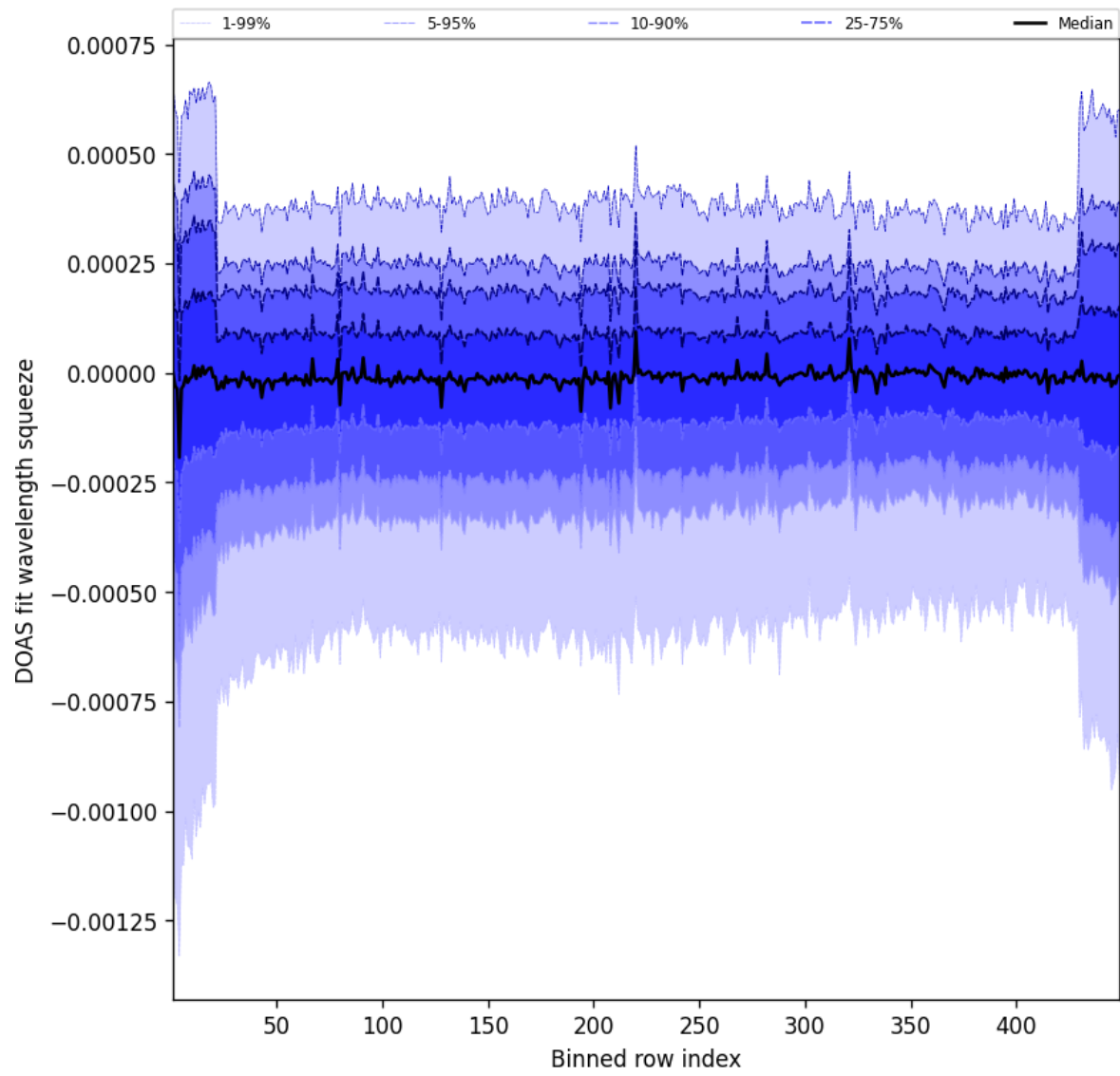


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-09-23 to 2025-09-23

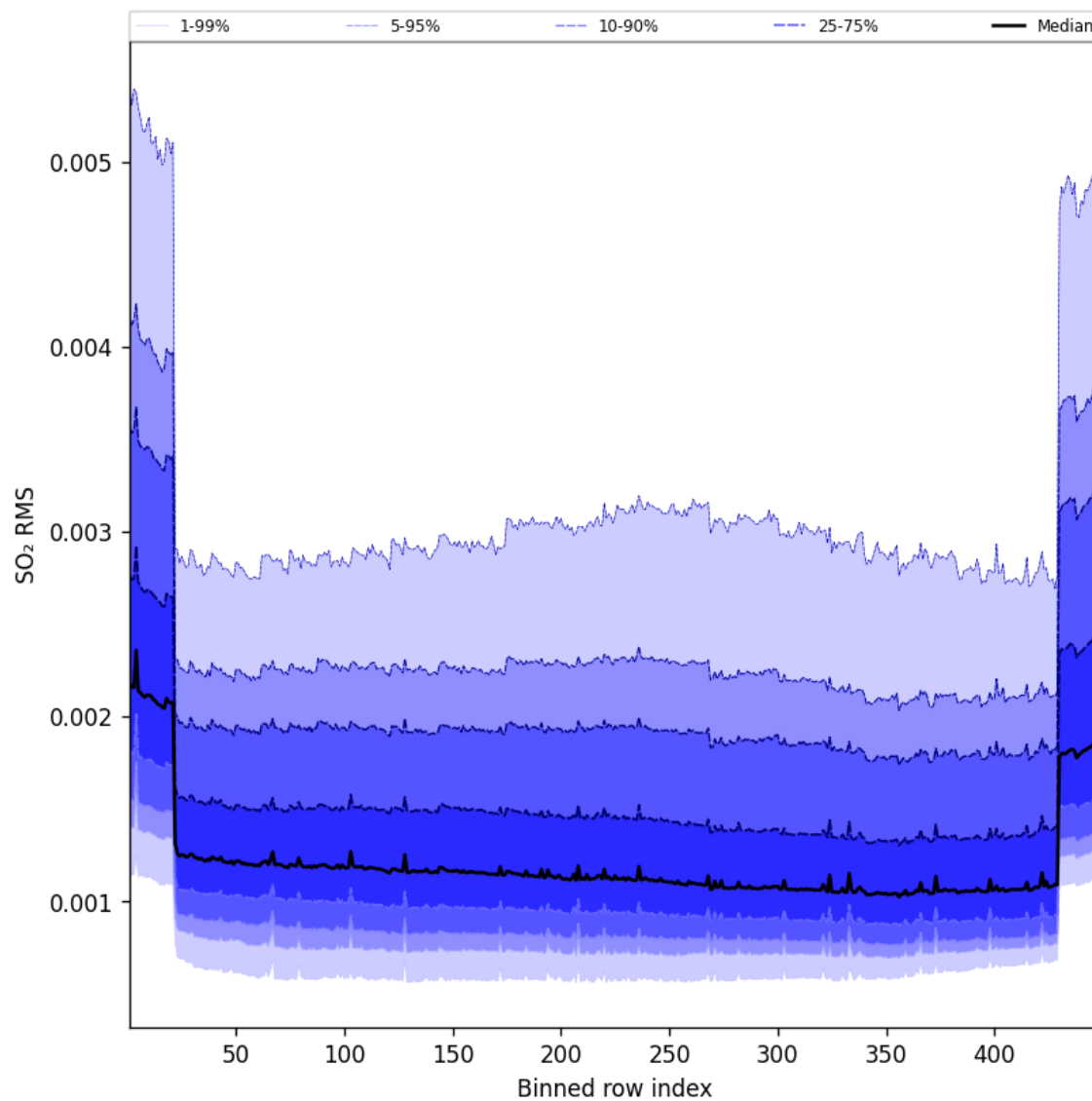


Figure 106: Along track statistics of “SO₂ RMS” for 2025-09-23 to 2025-09-23

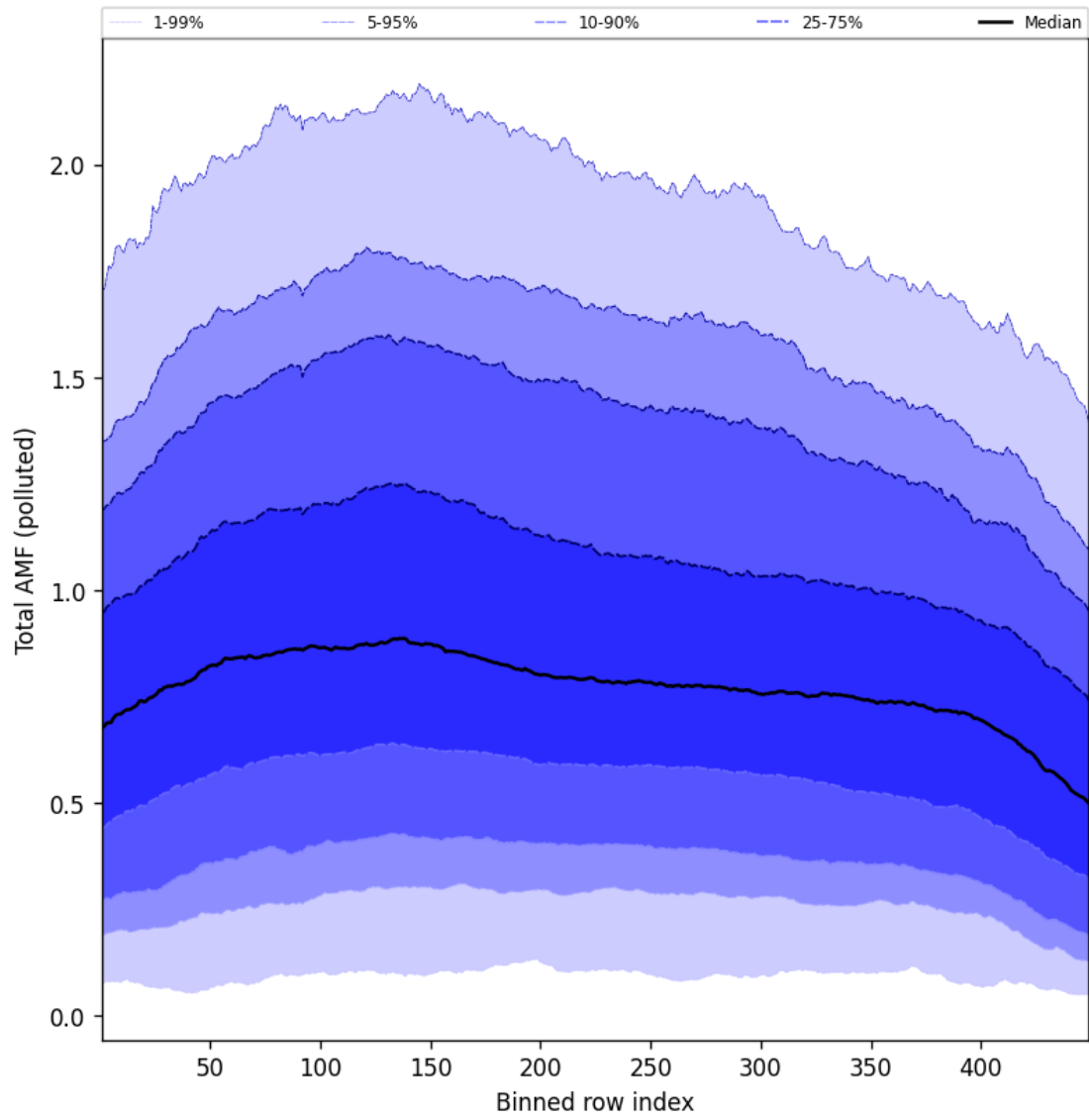


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-09-23 to 2025-09-23

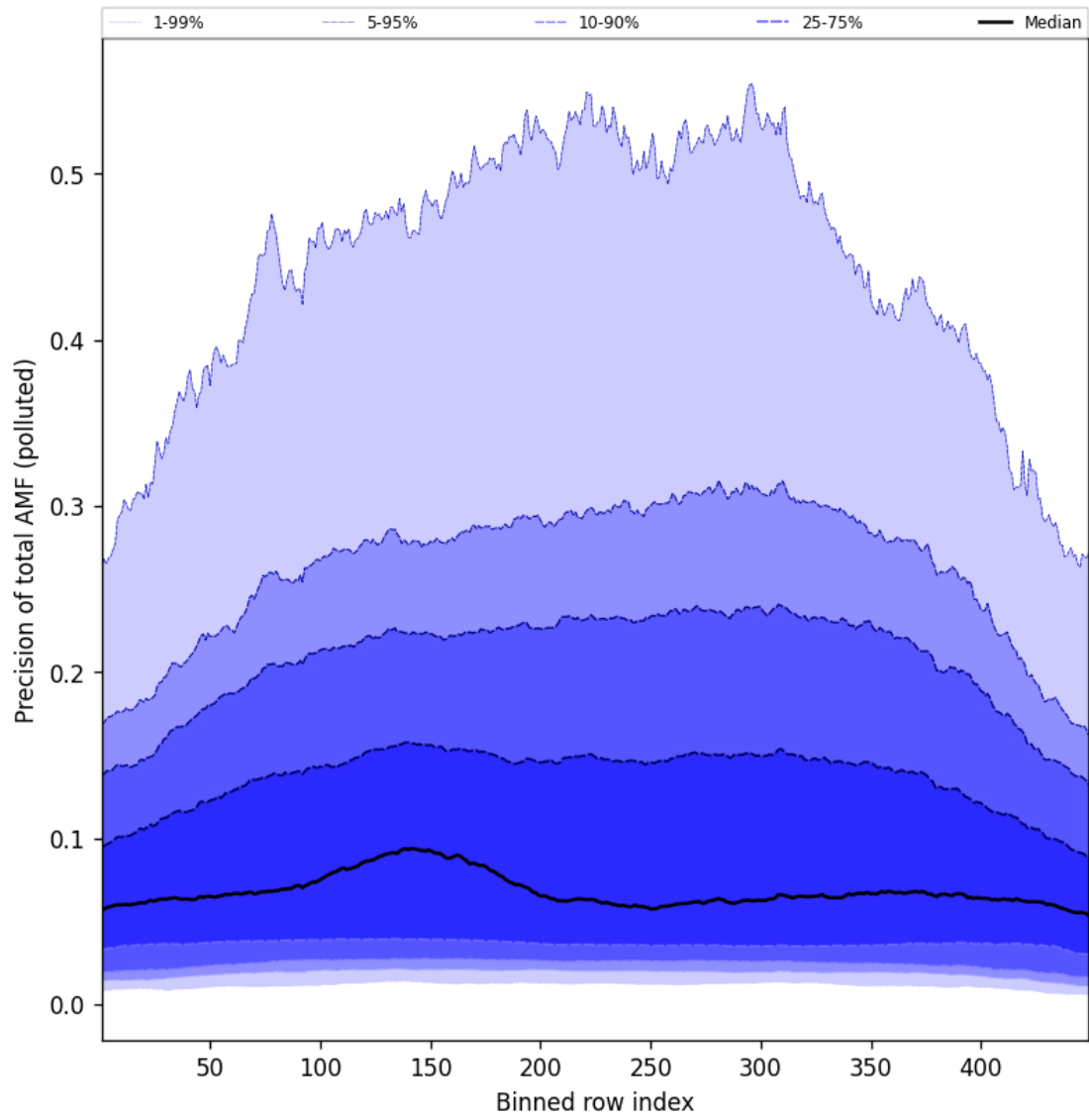


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-09-23 to 2025-09-23

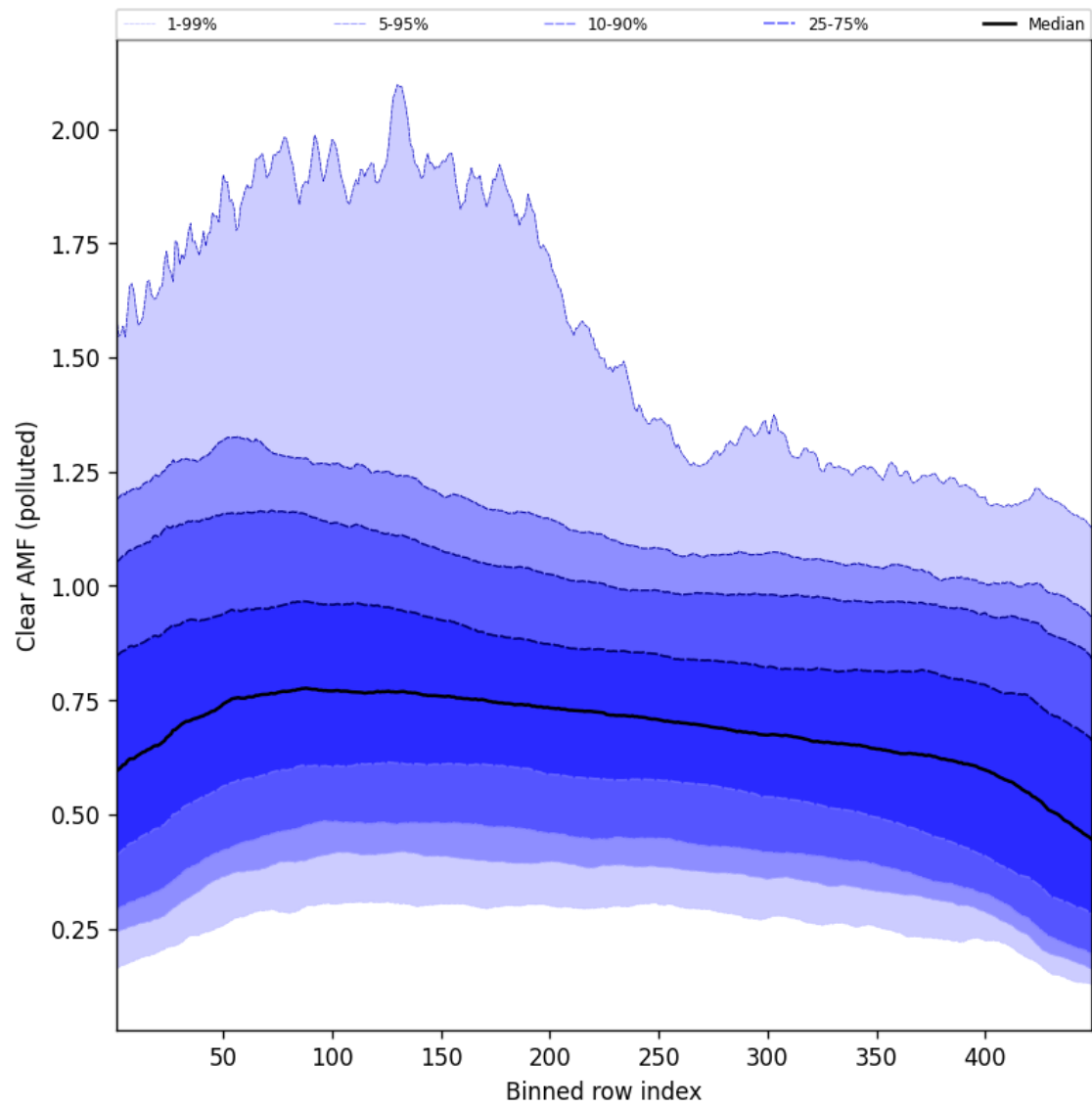


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-09-23 to 2025-09-23

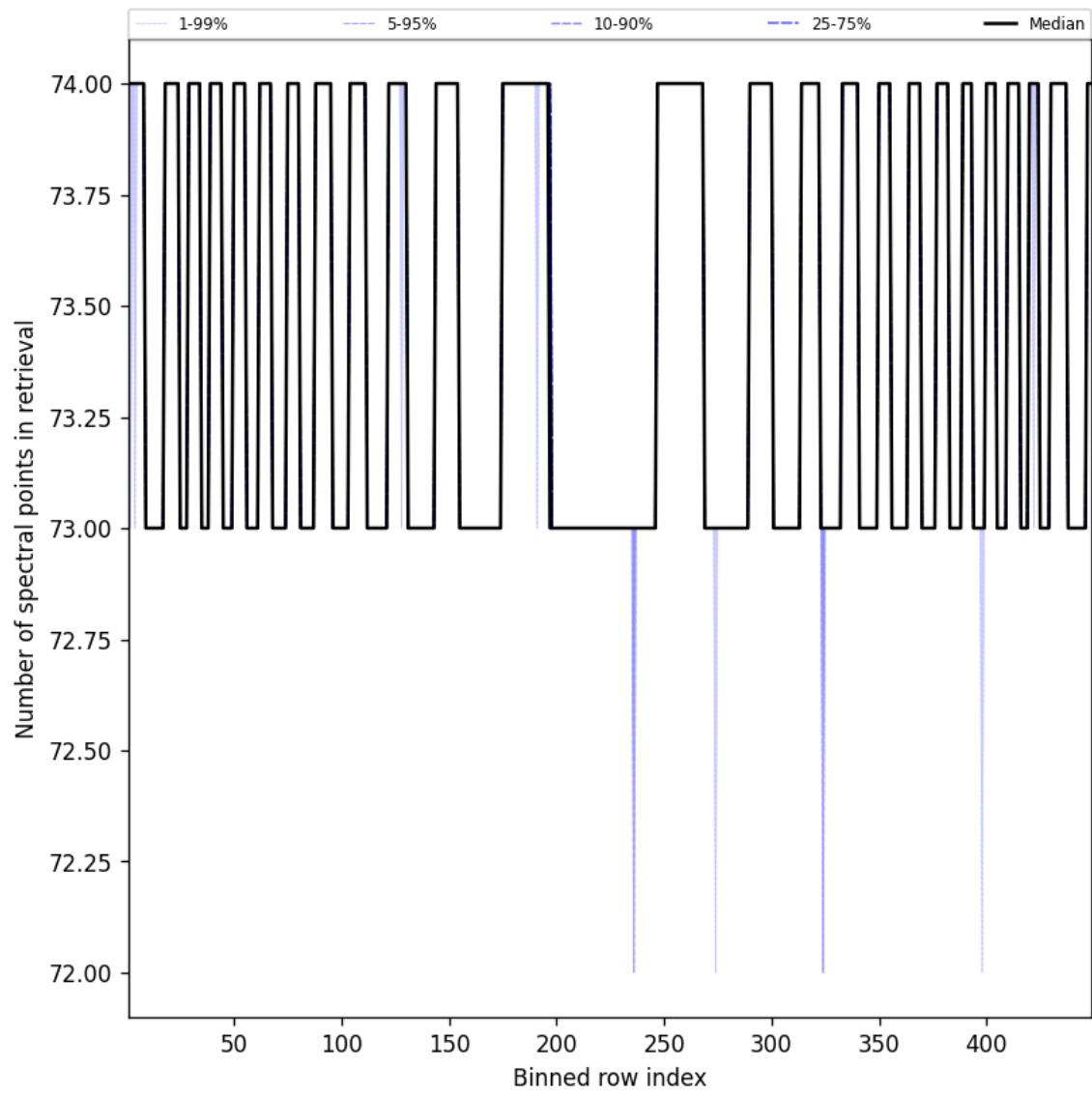


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-09-23 to 2025-09-23

10 Coincidence density

To investigate the relation between parameters scatter density plots are produced. These include some ‘hidden’ parameters, latitude and the solar- and viewing geometries, in addition to all configured parameters. All combinations of pairs of parameters are included *once*, in one direction alone.

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